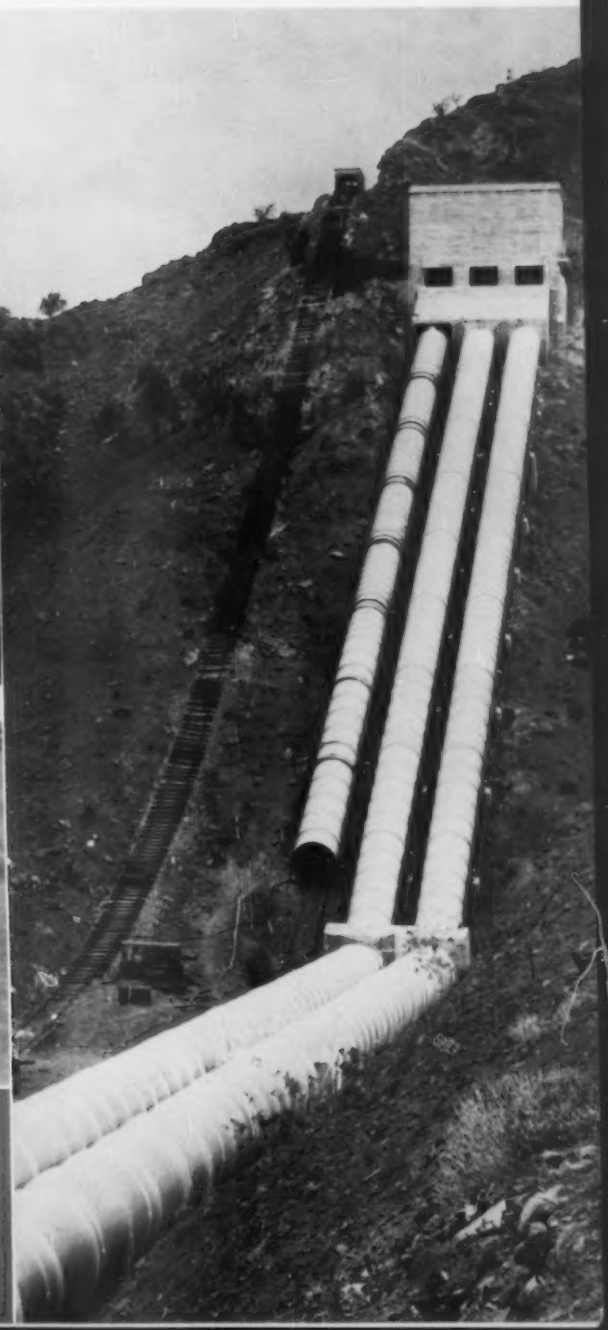
A Scranton Gillette Publication

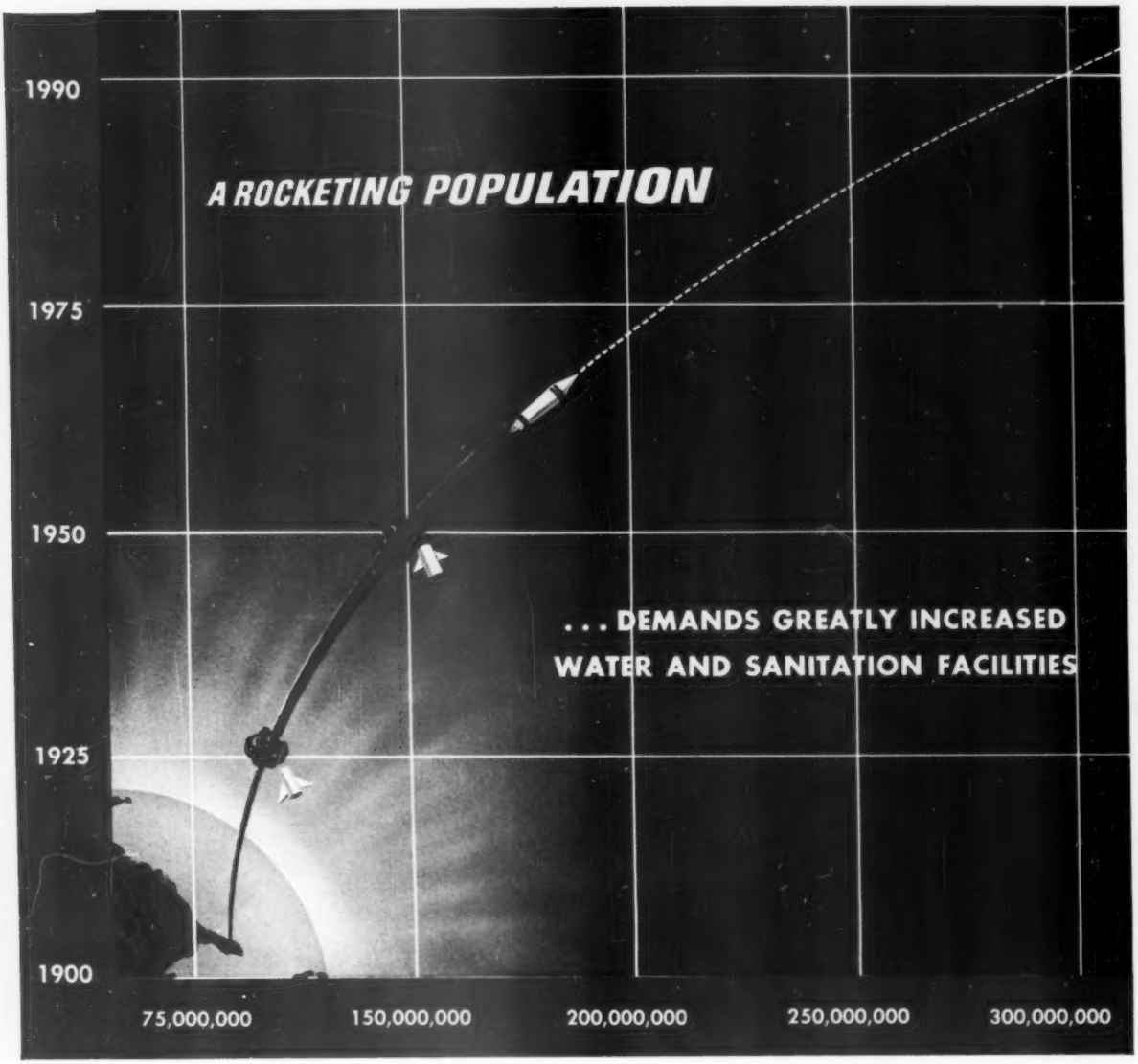
JANUARY 1960

WATER & SEWAGE WORKS

WATER SUPPLY • SEWAGE DISPOSAL



Water & Sewage field—1959 establishes new records in Automation & Construction. See pgs. 1, 11 and 19.



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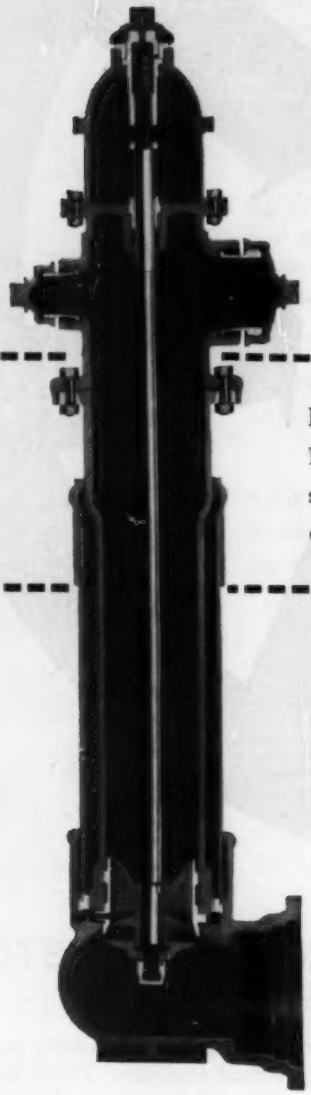

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Editor and Publisher

FRED C. MAURER
Managing Editor

V. W. LANGWORTHY
Field Editor

Contributing Editors

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J. R. Boylis	R. C. Merz
P. D. Haney	A. M. Rawn
C. E. Keefer	R. W. Simpson
C. F. Garnham	W. A. Cawley

CHICAGO OFFICE: 105 N. Wabash Av.
E. S. Gillette, Publisher
H. J. Conway, Adv. Ed.
F. C. Maurer, Managing Editor
V. W. Langworthy, Field Editor
L. J. Ritter, Constr. Editor
W. W. Hamilton, Western Sales Mgr.
M. C. Barr, Circulation Mgr.
R. J. Rooney, Makeup Editor

NEW YORK OFFICE: 155 East 44th St.
T. M. Todres, Administrative Assistant
Wm. R. Joyce, Midwestern Sales Mgr.
Terence McCoy, Eastern Sales Mgr.

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Duncan A. Scott & Co.

1901 West 8th St., Los Angeles 5, California
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Fred W. Smith, Sales Rep.

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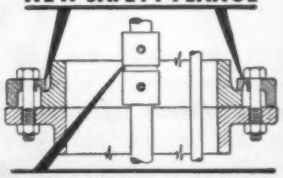

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WATERFORD NEW YORK

Briefs

Washington Reports begins a new, on-the-spot, monthly series which will keep our readers informed about the latest political developments concerning the Water and Sewage industry as they take place in our nation's capitol—Page 10A

Water Works Progress during 1959 was principally achieved in the growing public awareness of water industry needs, although important advancements were made in the increasing use of automation in water treatment plants and in the continued undertaking of major projects to improve existing local facilities—Page 1.

Sewage Works Progress—Construction of waste treatment facilities continues to improve and expand, but the lack of agreement on pollution control and abatement poses a threat to future progress—Page 11.

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Vertical Pumps—Part 17, of this series on centrifugal pump design, construction and maintenance continues and discusses the wet-pit units of both turbine and propeller (or modified propeller) types—Page 34

Sewer Service Charges and the way equitable rates to industry are, and perhaps should be, computed to cover sewer construction, use and maintenance costs are discussed—Page 38

Water Main Cleaning was the solution when an Illinois town had to answer the demands of its citizens for adequate water—Page 41

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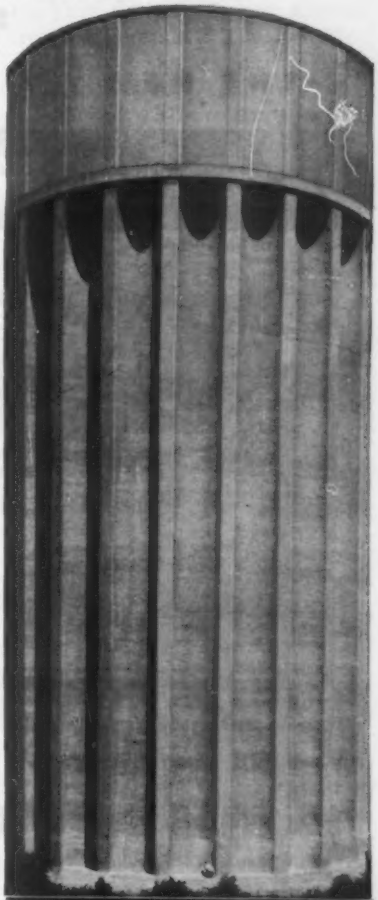

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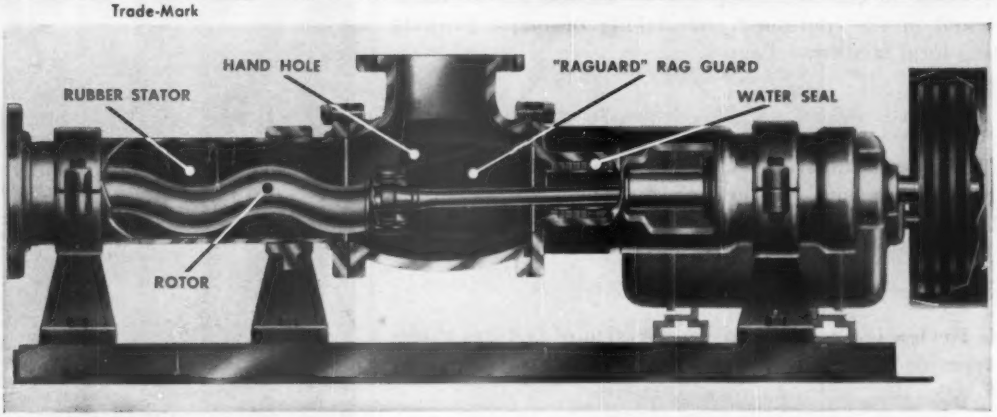

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News—Here & There

A BELATED ANNOUNCEMENT

Virgil W. Langworthy Joins W&SW Staff as Field Editor

Due to the end of the year rush, plus the fact that we have had him working so hard, the formal announcement of Virgil's joining our ever-growing staff missed the deadline for our December issue.

Mr. Langworthy, as many of you know, is well qualified for this appointment as he has had practical experience as a Water Conditioning Plant Operator and Superintendent, Research Chemist, Project Engineer, Lecturer and Author.

A graduate of Michigan State University, Mr. Langworthy holds an F2 Operator's Certificate for water plants in Michigan. He was Research Chemist for the Chlorine Institute for several years, leaving the Institute to become a project engineer. Mr. Langworthy presently holds the rank of Lieutenant Commander in the Naval Research Reserve.

A member of ACS, APHA, AWWA, and the WPCA, Mr. Langworthy is the author of many technical papers, a large number of which have appeared in the pages of WATER & SEWAGE WORKS.

In his new assignment, Mr. Langworthy will continue his long association in the water and sewage field, and will report on technical meetings, new plant and process installations, plus encouraging the publication of articles pertinent to the Sanitary Engineering Field.

We welcome Mr. Langworthy to our ever-growing editorial staff and look forward to many years of pleasant association.

Edward A. Gillette

Publisher

Chemical Society Changes Name

Division of Water and Waste Chemistry is the new name of the American Chemical Society's former Division of Water, Sewage and Sanitation Chemistry. The change of name was approved by the Society's Council during the 136th meeting which took place September 13-18, at Atlantic City, N. J.

Walsh Becomes Executive V.P.

Philip F. Walsh has been elected to the new post of ExecutiveVice President of the Southern California Water Company. For the past four years, he has been Vice President in charge of operations for the Water Company. In his new post, he will assume additional management responsibilities.

Mr. Walsh has been with the water utility since 1939. During World War II, he served with the U.S. Army Corps of Engineers as an instructor in water purification and later was assigned to the Engineering Board at Ft. Belvoir, Virginia.

A well known figure in the utility field, Mr. Walsh has been active in the American Water Works Association for the past twelve years, and currently serves on the A.W.W.A. Executive Committee, California section.

Engineering Firm Changes Name

Beginning with the new year, the New York City enginereing firm of Parsons, Brinckerhoff, Hall and McDonald will change its name to Parsons, Brinckerhoff, Quade and Douglas. The change is being made so that the firm's name will incorporate the names of two partners senior in service, Maurice N. Quade and Walter S. Douglas.

The firm was founded in 1885 by William B. Parsons and since then has developed many outstanding projects. Among these are the Garden State Parkway in New Jersey, the Hampton Roads Bridge-Tunnel Project in Virginia, and the Sunshine Skyway in Florida.

Current activities in water and sewerage include water storage projects for Newark, N. J.; Akron, Youngstown and Niles, Ohio; and sewerage systems for Binghamton, N. Y. and Baton Rouge, La.

John E. Rice Dies

Mr. John E. Rice, 54, chief chemist of the Washington, D. C., sewage treatment plant died October 20. With six other plant engineers, Mr. Rice designed and patented the Bearth process to improve sewage sludge digestion. This process is presently in use at 100 plants in the United States.

Engineers Move Office

Hazen and Sawyer, Engineers, have recently announced that they have moved their offices to 360 Lexington Avenue, New York, N. Y.

The photographs used in the "Replacement of Outfall Sewer" story that appeared on page 478 of our November issue should be credited to the Keasbey and Mattison Company, Ambler, Pa.

R. S. Ingols Elected ACS Division Chairman

Dr. Robert S. Ingols, head of the Department of Applied Biology at Georgia Institute of Technology has been elected chairman of the Division

CONTINUED ON PAGE 9A

FLUIDICS* AT WORK

New Simplex telemeter reads and controls 2 to 29 channels

The new Orthoplex telemetering system uses a biplex generator and biplex selector to achieve dual signal telemetering using a single pair of telephone lines.

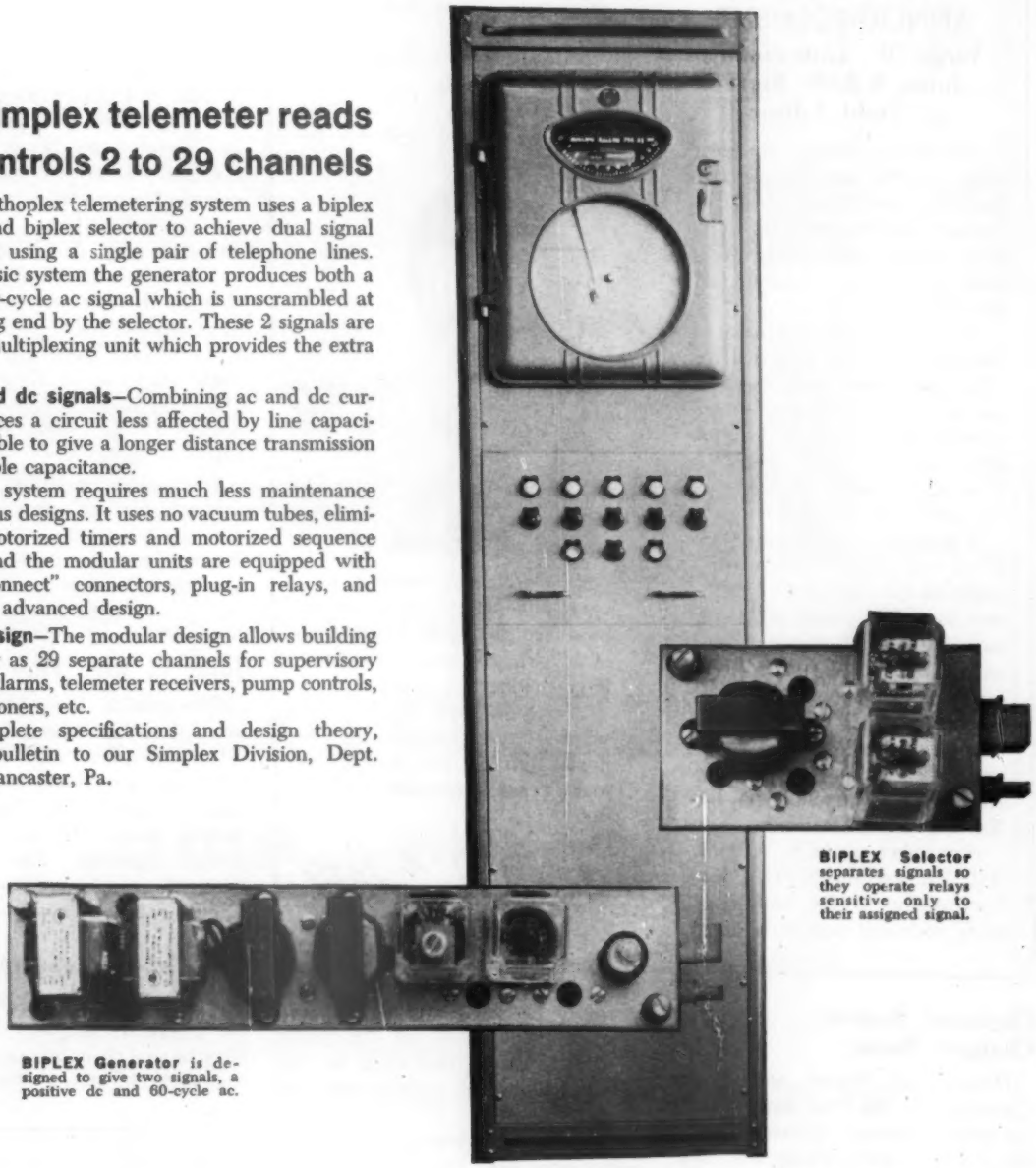
In the basic system the generator produces both a dc and a 60-cycle ac signal which is unscrambled at the receiving end by the selector. These 2 signals are fed into a multiplexing unit which provides the extra channels.

Uses ac and dc signals—Combining ac and dc currents produces a circuit less affected by line capacitance and able to give a longer distance transmission with available capacitance.

The new system requires much less maintenance than previous designs. It uses no vacuum tubes, eliminates all motorized timers and motorized sequence switches; and the modular units are equipped with "quick-disconnect" connectors, plug-in relays, and rectifiers of advanced design.

Modular design—The modular design allows building up as many as 29 separate channels for supervisory indicators, alarms, telemeter receivers, pump controls, valve positioners, etc.

For complete specifications and design theory, write for bulletin to our Simplex Division, Dept. WS-10, Lancaster, Pa.



BIPLEX Selector separates signals so they operate relays sensitive only to their assigned signal.

BIPLEX Generator is designed to give two signals, a positive dc and 60-cycle ac.

SIMPLEX Orthoplex Supervisory Control provides you with a system for remote control of valves and pumps from a central station.

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News—Here & There

CONTINUED FROM PAGE 7A

of Water and Waste Chemistry, American Chemical Society.

H. B. Gustafson, Infilco, was elected chairman-elect; Henry C. Brammer, Mellon Institute, secretary; John J. Maguire, W. H. & L. D. Betz Company, treasurer; Dr. T. E. Larson, Illinois State Water Survey, is Councilor and W. Allan Moore, Phillip Carey Manufacturing is alternate councilor.

Corrections and Additions to Patrick Article, December 1959, pages 531-535

We are publishing here corrections and additions to Miss Ruth Patrick's article, Aquatic Life in a New Stream, that came to our attention after our December, 1959 issue had been published.

Table 1 has been amended as follows:

Table 1
Chemical Analysis
Ridley Creek
(mg/L)

Alkalinity	25.8
Total Hardness as Ca CO_3	44.0
Calcium	3.4
Magnesium	5.3
Chloride	8.0
Dissolved oxygen	10.0
Iron	0.071
Nitrogen as ammonia	0.046
Nitrogen as nitrite	0.004
Nitrogen as nitrate	0.535
Phosphate	0.018
pH	7.2
Silica	6.0
Sulphate	6.4 (approx)
B.O.D.	1.4
Temperature	10.5°C

Table 5 should read:

Table 5
Total Nitrogen and Organics
Top Inch of Soil
Composing New Stream Bed
(Per Cent)

	Total Nitrogen	Organic matter
July, 1958	0.036	0.59
September, 1958		
Slack water	0.06	1.01
Below riffle	0.04	0.85
February, 1959		
Slack water	0.20	2.17
Below riffle	0.05	0.84

Three sentences below Table 5, the word *now* should have appeared rather than the word *not*. Also on page 533, third column, the fourth sentence of the second paragraph should read: "Smaller populations of the stonefly, *Strophopteryx fasciate* (Burm.), also appeared at a later date."

At the end of the article, an additional acknowledgement should be included: Soil Chemistry-Arthur Scheier.

W. Victor Weir Dies

W. Victor Weir, president of the St. Louis County Water Company, and five other utilities, died on Thursday, November 19, as a result of being shot by an individual who has been charged with murder. The incident related to the Company's foreclosure on property purchased by the individual and on which he was two years in arrears in payment on the deed of trust note.

Mr. Weir was active in the American Water Works Association for many years. He held many offices in this organization and was made a life member in 1954, an Honorary Member in 1956. He was also a member of the American Society of Civil Engineers. One of his major interests was the development of the Metropolitan St. Louis area of Missouri and Illinois and aided in the development of the civic Metropolitan Plan Association.

Beginning with this issue, Water & Sewage Works will feature its monthly *Washington Viewpoint*. This column will provide our readers with the up-to-date developments emanating from the Capitol as they concern the Water and Sewage industry. With legislation pending on new appropriations and regulations, we believe this coverage will both interest and benefit our readers.

Water Pollution Control Advisory Board

On November 19, 1959, President Eisenhower announced the appointment of two chief advisors to the Surgeon General of the United States Public Health Service to aid in administering the Federal Water Pollution Control Program.

John S. Samson of Omaha, Nebraska, and Dr. Russell Ellsworth Teague of Louisville, Kentucky, were appointed to the Water Pollution Advisory Board for three-year terms.

Mr. Samson, a lawyer who has long been interested in conservation matters, was one of the founders of the Omaha Chapter of the Izaak Walton League, and is Chairman of the League's state-wide Water Pollution Control Committee. He is also Chairman of the Nebraska Water Pollution Control Council.

Dr. Teague is currently the Commissioner of Health for Kentucky and is the Secretary of the Kentucky Water Pollution Control Commission. He is a former chairman of the Ohio River Valley Sanitation Commission, and a current member of the Kentucky Planning Committee for the White House Conference on Children and Youth.

The membership of the Board is as follows:

Dr. Leroy E. Burney, Chairman
Surgeon General, U. S. Public Health Service
Washington, D. C.

Mr. Irwin T. Bode
Former Director, Missouri Conservation Commission

Hon. William F. Duckworth
Mayor of Norfolk, Virginia

Mr. Seth Gordon
Former Director, California Department of Fish and Game

Mr. Anton Hulman, Jr.
Chairman, Indiana Flood Control and Water Resources Commission

Mr. Frank E. Long
Member, Wyoming Stream Pollution Control Advisory Council

Mr. John Samson
Chairman, Nebraska Water Pollution Control Council

Dr. Russell E. Teague
State Health Commissioner, Kentucky

Mr. William S. Wise
Director, Connecticut Water Resources Commission

Washington Viewpoint

Action on the Blatnik Bill (HR 3610) as Congress gets itself back in business this month, will be the prime matter of interest for Water and Sewage works men.

You'll recall that the bill came within a whisker of passage at the last session. It was passed without change by the House early in the session—including provisions to raise present annual Federal grants for stream pollution control and sewage disposal plant construction from $50 million annually to $100 million.

Then, at the very end of the session, the Senate suddenly pulled the measure off the shelf, and passed a version that would raise annual grants to $80 million. The bill didn't get into conference as Congress finally packed up and went home in September.

So, this year it'll be one of the first measures up for action. The betting is that it will pass—and the money it will carry will be nearer the House's $100 million than the Senate's version. And then it is almost certain that the President will veto it.

Note that "almost certain"—it applies to a lot of things that'll happen in Washington this year. The reason: This is a political year, with the Presidency, as well as control of Congress at stake. That will color a lot of thinking—and a bill such as HR 3610 is the kind of thing (like Public Works appropriations) dear to the hearts for all politicians, since it contins a little federal money for almost everyone.

The Administration last year came out flatly against the bill—in fact argued that it was past time for the federal government to get out of the field entirely, leave it to the states to handle. To change that attitude would be much out of character—except that the President must consider not only leaving office with a satisfactory record, he must also leave a record on which his party successor can stand (and get elected).

Of course, the federal money involved is only a small part of the actual expenditures generated by the program. The Department of Health, Education and Welfare figures that it can multiply the federal contribution by about four and a half, to arrive at a true figure (federal contributions can't exceed 30 percent of total costs of any specific project). Thus, a total of $131 million in federal funds has been put into the program (as of June 30) in the three years it has been running under existing law. But actual expenditures, so far, come to an estimated $685.2 million. If you also know that this total covers 1,583 individual projects, you can figure how much money gets into local construction pockets.

HEW figures, by the way, that there's a backlog of something like $1.7 billion worth of this work already piled up.

☆☆☆☆☆ ☆☆☆☆☆

There will also be a heavy water and sewage works interest in two other major matters that Congress will grapple with: Puublic Works appropriations, and the probability that the Bureau of Reclamation will ask for legislation broadening the base on which it considers feasibility of its projects.

What makes the Public Works matter interesting is the possibility that there could be some thaw in the Administration's attitude on "new starts". As noted, this would be a character switch—but, again, it's a political year. Most of the "new starts" that might be available quickly would come out of the $400-odd billion backlog of projects that the Army Engineerss have kept on their shelves for years, and many of these concern water supplies, pollution control and the like.

Bureau of Reclamation spokesmen, meanwhile, have made it definite that they will seek legislation that would permit them to consider pollution control, siltation control, fish and wildlife benefits, recreation, as well as irrigation, power and industrial water in deciding whether a project is feasible. A point here: Reclamation has a lot of projects on its "fiture" books that would be largely concerned with municipal water supplies, rather than with irrigation.

One thing that won't come up this time—it is carefully tucked away for another year—is the long and hot debate over diversion of additional water from Lake Michigan at Chicago. You'll recall that after eight days of seemingly aimless debate, the Senate last year tucked the bill away in its Foreign Relations committee, with instructions to turn in a report in 1961.

But the real reason for the serious objections of many Senators are interesting: They actually have little to do with the possibilities of lowering the Lake levels (some testimony said the Lakes would be lowered by an eighth of an inch—a pretty insignificant figure, in view of annual fluctuations due to evaporation and rainfall).

Real problem is the very real fear that Canada would get sufficiently miffed by such unilateral U.S. action to pull out of its international compacts with the U.S. And there are several billion acre-feet off for its own purposes, for instance. Canadian side, that Canada would like to cut of Columbia River water, on the

☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆

You can expect a report from Oklahoma's Bob Kerr and his Senate Select Committee on Water Resources during the session, but new legislation doesn't look likely at this point.

As you know, Kerr's committee has been holding hearings around the country ever since Congress finished up last year, and he has a top staff assisting him. One committee member—California's Engel—has said flatly that he'd like to see legislation calling for a single U.S. agency to handle water matters. But Kerr himself is too old a campaigner to permit such a controversial move this time around.

But the committee certainly will have some cogent reports to make before Congress winds up this time, probably no later than mid-July.

☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆

Another matter that'll get an airing, at least, this time around, is Senator Keating's (R., N.Y.) proposal for a "departmement of Urbiculture" as a cabinet-level organization, to do for cities what Agriculture is supposed to do for farmers.

Nobody expects the idea to get anywhere, really. But the thinking behind it is interesting. Among Keating's proposals: Put all water supply and pollution agencies under the new department, to obtain coordination of efforts, in view of the growing urbanization of the nation, which is rapidly engulfing artificial political and regional boundaries.

☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆

Washington area communities—already much concerned with the heavy load of silt and pollution carried by the broad, shallow Potomac River—have been working on a new worry recently: What's to become of the sewage and drainage from the government's new jet-age airport (Dulles International) at Chantilly, Va.

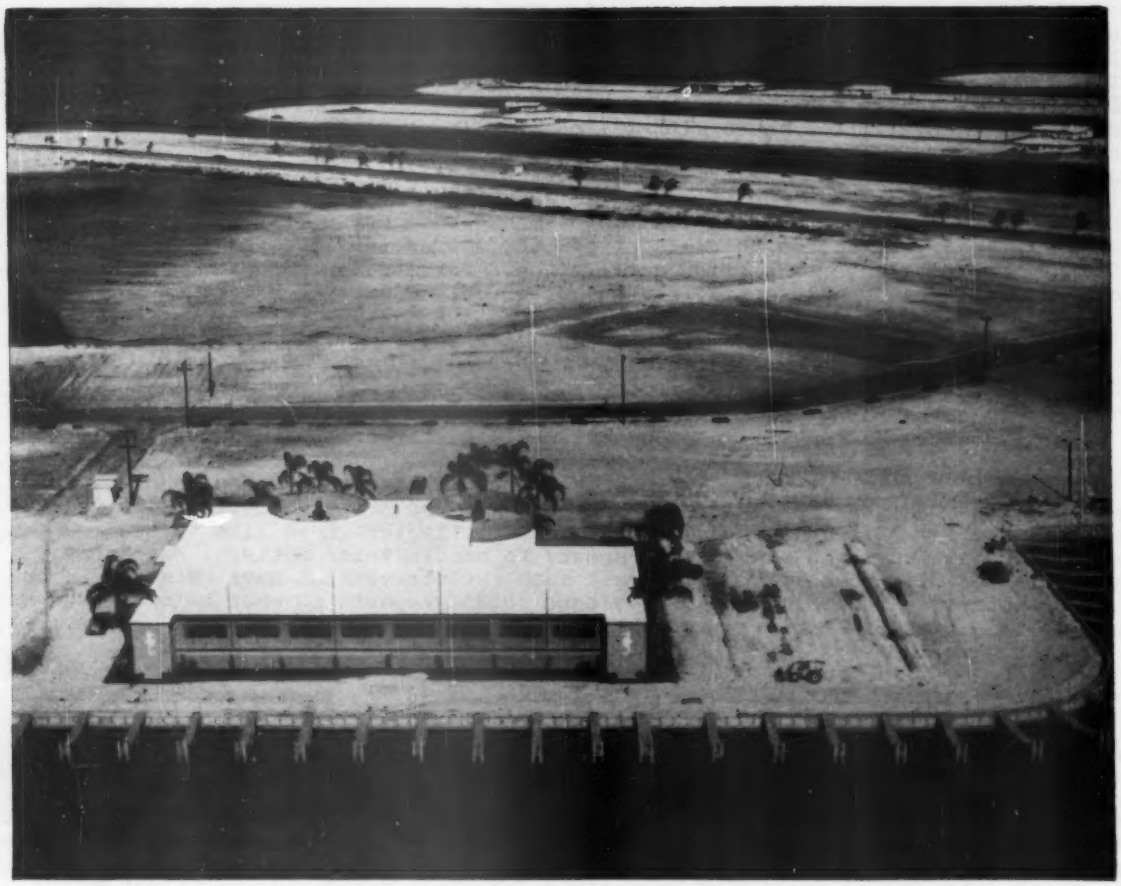
Problem is that the airport itself comprises an area of close to 15 square miles, of which large portions will be paved or otherwise surfaced to produce a major increase in runoff from an area previously entirely in farmland and rural residence use. In addition, construction of the airport as an employment magnet, plus construction of new superhighways to reach it is expected to boom the present sparse population into major suburban proportions—with, of course, an attendant increase in sewage output.

Worse yet, the natural outlet for the runoff and sewage—a stream known locally as Broad Run—is well above intakes in the main river that supply drinking water to much of the Washington metropolitan area.

Proposals by the Federal Aviation Authority to build primary and secondary sewage treatment plants, to handle only sewage produced by the airport, have been flatly opposed by local communities, which feel that the federal government—having created the problem in the first place—should shoulder some of the expenses to be incurred. The Northern Virginia counties affected (Arlington, Fairfax and Loudon) in fact, would like the federal government to build a major trunk sewer line through the three counties to a point well downstream of Washington itself, thus to discharge below water intakes, and incidentally to be tapped by communities along the way. So,far, FAA hasn't been enthusiastic about this idea. Anyway, Congress has so far provided only $750,000 for an airport sewer system and disposal plant.

However, under a Presidential order last summer, FAA is restudying the problem.

Meanwhile, counties and local communities are piling up protests and suggestions for change.



Clearwater, Florida's new Marina Station Sewage Treatment Plant serves the Clearwater Beach area and Marina facilities for this growing resort area. P.F.T. equipment plays an important part in this attractive, modern plant. *Briley, Wild & Associates, Daytona Beach, were the Consulting Engineers.*

Clearwater's new treatment plant enhances boating facilities for resort area

In the midst of the much sought after marina mooring facilities this architecturally attractive, completely enclosed treatment plant blends into the recreational features of the area. Even the air in the ventilation system is treated with ozone to assure the elimination of all odor.

The digested sewage sludge will be hauled in an especially designed tank truck to the main city treatment plant site for disposal.

Clearwater's Marina Station is a progressive solution to a modern sewage treatment problem. It is a fine combination of modern planning and modern equipment.

The P.F.T. equipment at Marina Station includes: two 40′ Floating Covers, one P.F.T. Pearth Gas Recirculation Unit, two Liquidometer Position indicators with High and Low Level Alarms, two Supernatant Selectors and Gauges, one lot of Gas Safety Equipment, one #170 Heater and Heat Exchanger Unit.

Waste Treatment Equipment
Exclusively since 1893

P.F.T.

PACIFIC FLUSH TANK CO.
4241 Ravenswood Avenue
Chicago 13, Illinois

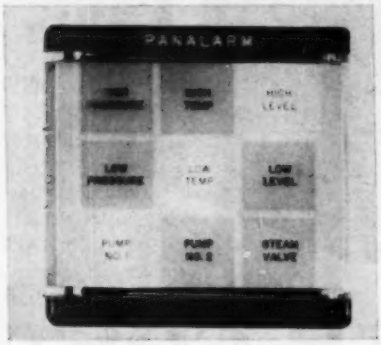
PORT CHESTER, N. Y. • SAN MATEO, CALIF. • CHARLOTTE, N. C. • JACKSONVILLE • DENVER

Equipment News

Miniature Solid State Annunciator

101

Panellit, Inc., Skokie, Ill., has introduced a new, solid state, miniature, lo-drain, intrinsically safe, expandable annunciator designed to provide information and control of process systems.



The Panastat annunciator has no moving parts; all operational functions are performed by highly derated solid state elements. Low energy control circuits (a tiny fraction of 1500 millijoules) and negligible inductance (much below .001 Henry) provide intrinsic safety. Ignition in hazardous atmospheres is prevented because no arc can be sustained.

This new miniature unit can be supplied to fit a 5″ x 5″, a 6″ x 6″ standard pneumatic or electronic instrument case, or any standard annunciator cabinet.

Odor Control for Plants and Lift Stations

102

Rhodia, Inc., New York, N. Y., has introduced two, new Alamask products for the control of malodors originating from wet walls and sewage lift stations.

Alamask RLT-630, according to the company, has proven effective in controlling pumping plant odors when applied at the rate of 1 to 3 ppm by drip feeding or by the use of ½ lb. per week in a wet well.

Water dispersible Alamask RLT-630-X also has proven effective in abating pumping plant malodors. This product is applied by spraying a dilution of 2 to 4 ounces of Alamask RLT-630-X per gallon of water close to the liquor level at the rate of 1 to 3 gallons of the dilution per 100,000 gallons of effluent.

The company states that lift station malodors have been controlled by the use of Alamask RLT-630 applied at a concentration of .5 to 1 ppm by drip feeding. Alamask RLT-630-X is said to be satisfactory for this purpose also.

Pipe Pushers Have New Design

103

Mercury Hydraulics, Denver, Colo., has announced major design changes in their fully powered Speed-Thru pipe pushers. The 1960 models incorporate a new, higher speed, 12-inch stroke design, pushing one foot in 11 seconds.

The new pushers, which come in three sizes capable of gripping up to

4″ pipe, with thrusts up to 110,000 lbs., are available now, in time for the winter season and frozen ground installations. The shorter stroke, according to company engineers, serves to increase speed, provide easier handling because of the shorter length and lighter weight, and has more strength in the structural design.

Field engineers for the Speed-Thru claim that high pressure tests in the field with the new models showed increased pushing accuracy and a complete elimination of upward or side movement of the pushing unit, even under severe thrust conditions.

Other features of the new models include a non-crushing, self-gripping and releasing pipe clevis, wider trackage for the thrust carriage wheels, and a 20% increase in operating pressures over the previous models. The new pushers can all be installed in an operating trench as short as 52 inches.

High Speed Synchronous Vertical Motors

104

Ideal Electric and Manufacturing Co., Mansfield, Ohio, announces the availability of new, high speed, synchronous, vertical motors in a wide range of enclosures. The motors are offered in sizes of 150 hp and up, and in frames 584 and larger.

Ideal synchronous verticals are designed for situations where high horsepower and low speed ratings are demanded for rigorous and exacting requirements, constant speed jobs or continuous duty installations. Longer insulation life while the motor is operating at full capacity and continuous duty is achieved through the use of a specially designed, double-end ventilation system for maximum cooling efficiency.

Various methods of actuation can be provided for the Ideal synchronous motors, including direct-connected exciters, motor generator sets and excitation for the plant DC power supply.

Winter-Proofed Liquid Level Control

105

Magnetrol, Inc., Chicago, Ill., has developed and made available a new, No-Freeze, liquid level control designed to perform during the winter season on outdoor water storage tank installations.

The new model is a complete package unit that may be installed in outdoor tanks by means of bracket mounting. Its switch housing is submersible so that it may be unaffected by a heavy collection of humid atmosphere or by a complete immersion of the head itself. Internally, the mercury switch is protected against freezing weather by its vapor-proof construction, and by a resistance heater which keeps the housing interior warm.

The control is also designed to perform and accurately record the true water level of the tank even in near-freezing weather when ice forms on the surface of the stored water. By a process of heat radiation, a sufficient area around the displacer tube is kept free of ice enabling the control to work regardless of how thick the ice formation may become.

CONTINUED ON PAGE 15A

NEW-DESIGN

R-C blower delivers more CFM

The new R-C Type RAS Blower is available in 36 sizes covering a capacity range of from 2,000 to 14,000 cfm at pressures to 6 psig and from 1,500 to 8,000 cfm at pressures to 10 psig.

AT LOWER POWER COST

A new, high-performance R-C rotary positive blower (designated Type RAS) features two important design improvements. *First,* a new "segment waist" impeller contour that increases the volumetric efficiency of the blower. *Second,* a new vertical arrangement of the impellers that increases application flexibility.

The design of the "segment waist" impeller contour permits a higher pressure rating for a given impeller length. This in turn delivers greater displacement per revolution without increasing operating speed and at a lower power cost. And, in addition to being more quiet in operation, the design permits safe handling of entrained liquids.

The vertical arrangement of the impellers provides horizontal inlet and discharge connections for more convenient, simplified piping. Extremely compact, the blower also offers substantial savings in space requirements. And, as with all R-C rotary positive blowers, air delivered is free from oil vapors and other contaminants.

Roots-Connersville RAS blowers offer many advantages—exclusive rotary positive design, ease of installation, efficiency of operation, and long years of trouble-free service. These features are the result of R-C's specialized experience of more than 100 years in the design and application of air and gas handling equipment.

For gas service too... This same new design is also available in pumps for gas service. Designated Type RGS, the gas pumps differ from Type RAS Blowers only in that a mechanical face type seal is used instead of a lip seal.

For additional data, please refer to pages 565-568 in **Chemical Engineering Catalog,** *our section in* **Mechanical Catalog,** *or write for* **Bulletin RAS-158.**

ROOTS-CONNERSVILLE BLOWER
DIVISION OF DRESSER INDUSTRIES, INC.
100 Mount Ave., Connersville, Indiana. In Canada—620 Adelaide St., W., Toronto

ONE OF THE DRESSER INDUSTRIES

Equipment News

CONTINUED FROM PAGE 13A

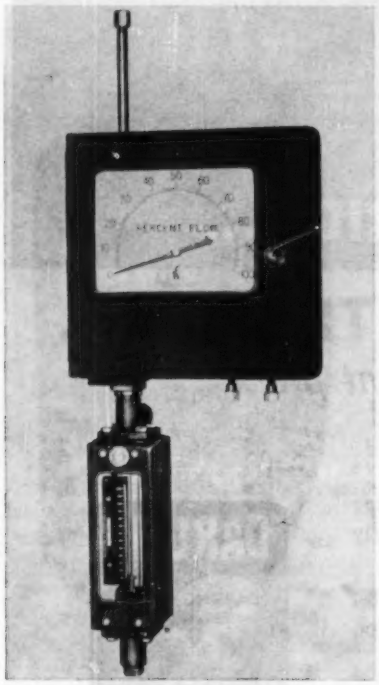
Pneumatic Transmitting Rotameter

106

Schutte and Koerting Co., Cornwells Heights, Bucks Co., Pa., has announced the availability of a new, Pneumatic Transmitting Rotameter for air signaling fluid rates of flow to remotely located recorders and controllers.

The unit was designed for ease of calibration. Four calibration adjustments permit accurate field recalibration whenever basic operating conditions change; no cams are used in these adjustments. Another exclusive feature is a magnet design which provides an evenly distributed magnetic field without drag on the metering float.

The new meter's pneumatic trans-



mitter, designated Model 58, is a "position balance" type which gives a high degree of accuracy. The transmitter is suitable for use on either the "Safeguard" glass-tube Rotameters or the metal-tube units.

The percent scale on the trans-

CONTINUED ON PAGE 17A

Cleveland 80W lays pipe for 13-mile sewer line—does backfilling, too

G. C. McLeod Co. of Edmonton, Alberta made extensive use of its Cleveland 80W for laying 20″ and 8″ asbestos pipe on a 69,000-foot sanitary sewer line in Nanaimo, B. C. Even in the extremely wet and heavy mud of the salt water tidelands shown above, construction moved ahead 800—1,300 feet daily. As the line progressed into drier ground, the 80W was further employed in backfilling and cleanup operations.

THE ONE-MAN-OPERATED 80W

- **DOES SIDEBOOM WORK OF ALL KINDS,** unloads, strings, lays pipe, sets valves, hydrants, etc.
- **BACKFILLS SPOIL** clean and fast from *either* side of trench.
- **TAMPS SPOIL** simultaneously with pull-backfilling, or separately, as required.

Check with your distributor now—get the complete 80W story

The CLEVELAND TRENCHER Co.

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Good Everywhere ®

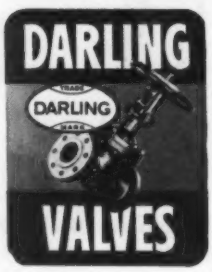
DARLING VALVES GET THE CALL

in new high capacity sewage treatment plant

Shown above is the main pump room at the new Puerto Nuevo sewage treatment plant in San Juan, Puerto Rico... designed to serve nearly 600,000 persons by 1975.

Here, Darling Valves are on the job... ranging in size from 3" to 48". Darling's exclusive *fully revolving double disc parallel seat* feature and "no pocket" discs provide positive sealing and assure ease of operation.

As in cities throughout the U.S., Darling Valves "get the call" because of their reputation for outstanding quality and long, trouble-free service life. Tell us about *your* requirements.



DARLING VALVE & MANUFACTURING CO.

Williamsport 22, Pa.

Manufactured in Canada by The Canada Valve & Hydrant Co., Ltd., Brantford, Ont.

Equipment News

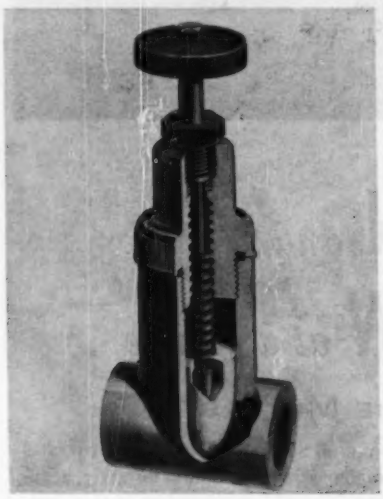
CONTINUED FROM PAGE 15A

mitter case may be used for any calibration, and a factor tag on the dial face may be used to convert scale units to flow quantity. Varying supply air pressure, between 20 and 25 psig, does not affect accuracy.

Plastic Gate Valves Available in Penton

107

Vanton Pump and Equipment Corp., Hillside, N. J., have expanded their line of plastic valves to include models made of Penton. These new valves are designed to meet the process industries and facilities needs for plastic valves with a greater chemical resistance to organic and inorganic agents at high temperatures.



The "throttlable" Vanton Penton valves are claimed not to lose tensile strength or hardness, and are not subject to elongation at elevated temperatures, (100-125° C). They are generally resistant to all inorganic acids except fuming nitric and fuming sulphuric acids. These valves are particularly suited for use in process operations that require continuous exposure to a corrosive media at high temperatures.

The new Penton valves are available in sizes from ½" to 2" with socket weld, flanged, or screwed connections.

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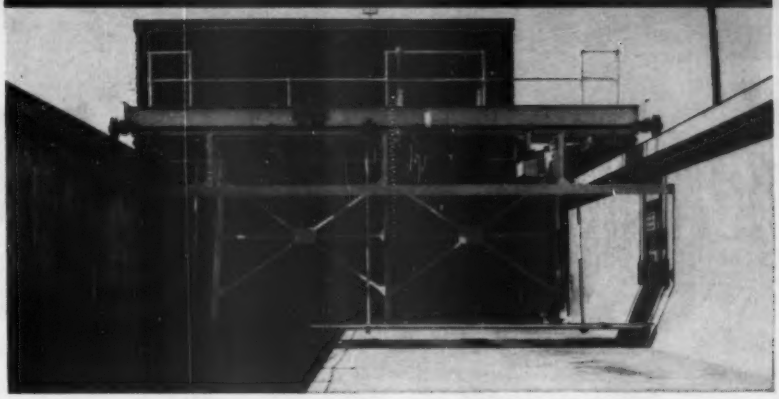
HARDINGE CLARIFIERS
for rectangular tanks



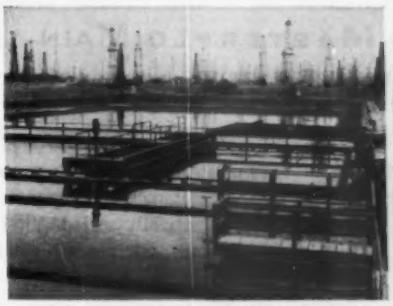
The Hardinge Rectangular-Type Clarifier is similar in operation to an industrial, overhead crane. It travels on two rails, on the outside walls of the settling tank, scraping settled solids to a sludge hopper at one end. A skimmer may be added to remove scum and floating material from the tank surface on the "return trip" of the Clarifier.

Advantages of the Hardinge unit are these:

(1) Settling tank installations may be made in limited space (as opposed to the circular type clarifier).
(2) Maximum use of common wall construction is possible, when there are two or more tanks involved.
(3) A single Clarifier mechanism can operate over two adjacent settling tanks (duplex arrangement) reducing equipment cost.
(4) Clarifier equipment cost does *not* increase with tank length.
(5) All essential working parts are above liquid level.

Hardinge has installed more than 80 Rectangular Clarifier units for municipal sewage treatment, industrial water treatment, and for liquid wastes at paper plants, textile mills, and oil refineries—processing in excess of 350 million gallons of liquid daily.

Write for Bulletin 35-D-15.



A Hardinge 57'–10" Duplex Rectangular Clarifier operating over two 150' tanks in a refinery waste water disposal plant.

30' wide by 120' long Hardinge Rectangular Clarifier in a sewage treating plant. Skimmer in raised position.

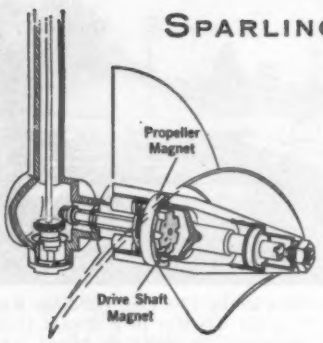
HARDINGE
COMPANY, INCORPORATED

YORK, PENNSYLVANIA • 240 ARCH ST. • Main Office and Works

New York • Toronto • Chicago • Hibbing • Houston • Salt Lake City • San Francisco • Birmingham • Jacksonville Beach

TOTALIZATION *and* RATE OF FLOW *at a glance*

SPARLING MASTERFLO MAIN-LINE METERS



DIRECT TOTALIZATION is the primary function of all Sparling Meters. The SPARLING MASTERFLO also shows *rate of flow* to give *complete* flow information instantly, accurately and continuously without the use of conversion tables or secondary instruments.

SUPERIOR PERFORMANCE of the MASTERFLO meter is a result of Sparling's exclusive magnetic drive. A combination of magnets in propeller and drive shaft permits entire gear box to be hermetically sealed. Vital parts are protected from corrosion, and without packing glands, friction is negligible. Accuracy is assured; maintenance is reduced; meter life is extended.

SPARLING MASTERFLO MAIN-LINE METERS represent the most advanced metering equipment in the water works field. Sizes 4″ to 24″ and suitable for 150 or 250 psi working pressure.

SPARLING
WATER CONTROL EQUIPMENT
Hersey-Sparling *Meter Company* *225 N. Temple City Blvd., El Monte, California*

Call your nearest Sparling office for complete information, or write for Technical Bulletin CF-907-1

East Coast Manufacturing Facilities, Dedham, Mass.

Atlanta 3 • Chicago 4 • Cleveland 13 • Dallas 1, Tex. • Denver 6 • Kansas City 6, Mo. • Roselle, N. J. • San Francisco 24 • Seattle 99 • Romford, England
United Kingdom Affiliate: TYLORS OF LONDON LTD.

Eliminate SCENTS for with

AQUA NUCHAR

ACTIVATED CARBON FOR TASTE AND ODOR CONTROL

You guarantee PALATABILITY for pennies per application when you control taste-and odor-forming substances in your plant with AQUA NUCHAR Activated Carbon.

Every gram of AQUA NUCHAR contains 120 billion particles of activated carbon with 800 square yards of surface area to trap and remove odors. That's why extremely low concentrations (2 - 5 ppm average) are fully effective.

More than 1200 water plants have used AQUA NUCHAR and its universal effectiveness against taste- and odor-forming substances is well recognized.

Why not let our trained field service staff help you set up a PALATABILITY program in your plant? Phone or write us today.

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division west virginia pulp and paper company

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IF YOUR DECISION MUST STAND UP FOR 100 YEARS

If your decision today will in some way determine your town's water supply system for the next century, consider the case for cast iron pipe:

- Cast iron pipe is built to *last*—96 American cities will testify to that. They've had cast iron pipe installations in constant use for over a century! And in Versailles, France, they're still using cast iron pipe water mains that were laid in 1664! Solid proof that once cast iron pipe is in the ground, it stays there!
- Cast iron pipe rarely requires repair. Its rugged construction, corrosion-resistant qualities and bottle-tight, rubber-ring joints will withstand the most severe pressures. Once an investment is made in cast iron pipe, it is usually your first and last cost because of the absence of maintenance or repairs.

Don't be fooled by initial pipe costs. You can't save money on "low-cost" pipe if you have to repair and replace it frequently. Insist on the pipe that will actually save you money over a period of years—cast iron pipe!

Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 3440 Prudential Plaza, Chicago 1, Illinois

Rely on

CAST IRON PIPE

THE MARK OF THE 100-YEAR PIPE

GENERAL AMERICAN INSTALLATION BRINGS WATER TO THE STARS...

Palm Springs is a thirsty city. In this desert playground of movie stars and sun-worshippers at the foot of water-rich Mt. San Jacinto are more gardens and swimming pools per capita than any other place in the world. Within the mountain are many underground streams. The problem was to tap the resources and store more water than existing reservoirs would hold. The answer—a 5,000,000 gallon tank fabricated in General American's shops, trucked to a hard-to-reach spot on the hillside and erected by a General American field crew.

General American won this contract because of ability to fabricate the tank and erect it despite difficulties of terrain. Shops at many locations and strategically-based field erection crews make it possible for General American to do the job efficiently in any part of the country.

We would like to discuss your water storage problems, so why not write or phone the nearest General American office. You'll find *it pays to plan with General American.*

Plate and Welding Division
GENERAL AMERICAN TRANSPORTATION CORPORATION
135 South LaSalle Street • Chicago 90, Illinois
Offices in principal cities

Equipment News

CONTINUED FROM PAGE 17A

Automatic Water Conditioner

108

Water Refining Company, Middletown, Ohio, has announced a new line of completely automatic, commercial water conditioning units. The full line of Miracle Water Conditioners includes capacities ranging from 30 to 180 gallons per minute based on 40 psi, and are designed to produce 10,800 gallons per hour of uninterrupted, completely refined and softened water. Rust, iron and turbidity are removed as well as hardness.

Each mineral bed of the unit is automatically controlled and is independent of the other beds. Extra beds may be added to increase the unit's capacity according to the need. The new Miracle commercial units feature a patented, 5-cycle valve with only 3 moving parts and a patented Electro-Selector that eliminates floats and brine valves. Water conditioning is controlled by a simple setting made only at the time the unit is installed.

Meter Box for Outdoor Reading

109

Handley-Brown Company, Jackson, Michigan, is now offering a new, meter box that permits outdoor reading and servicing. Called the Meterminder, it is designed to be installed in an outside wall just above the house foundation.

The exterior cover of the Meterminder and its drip tray are fabricated from a rubber-resin compound (A.B.S. polymer) so it will not corrode. The remaining parts are made of aluminum to simplify installation and to provide a corrosion resistant installation.

The Meterminder is available in two models: model WMS-⅝ is for ⅝" water meters, and model WMS-¾ is for either ¾" or ⅝" x ¾" meters. Although the Meterminder is designed principally for houses lacking basements, a similar meter is also manufactured by the company for use in homes with basements.

CONTINUED ON PAGE 26A

AURORA® CONTROLLED PERFORMANCE

MONO-VANE

NON-CLOG PUMPS

"The Pump with the single passage impeller"

MONO-VANE IMPELLER

- CAPACITIES TO 1000 G.P.M.
- HEADS TO 150 FT.
- BALANCED IMPELLER
- HORIZONTAL OR VERTICAL
- RUGGED CONSTRUCTION
- PROVEN DEPENDABILITY
- MINIMIZED WEAR
- FAST INSTALLATION
- EASY MAINTENANCE

The Mono-Vane impeller is in hydraulic and dynamic balance. It can be trimmed to suit various head and capacity requirements and still retain proper balance. The AURORA Non-Clog Pump is ideal for handling long stringy materials. Smooth, quiet operation is assured with the Mono-Vane impeller which is always in dynamic and hydraulic balance—even when trimmed to accommodate various head and capacity requirements. Single passage impeller design makes the AURORA Non-Clog pump ideal for handling long stringy materials. The discharge may be turned to any position to facilitate installation, service and maintenance. Clean-out cover is located in casing to provide easy service access.

Typical applications: elevating sewage, pumping sludge, handling heavy settleable solids, effluent, and other wastes and industrial by-products.

WRITE FOR BULLETIN 121 MV

AURORA Always PUMPS

AURORA PUMP DIVISION
THE NEW YORK AIR BRAKE COMPANY
1020 LOUCKS STREET • AURORA • ILLINOIS

LOCAL DISTRIBUTOR IS LISTED IN THE YELLOW PAGES OF YOUR PHONE BOOK

For the entire city of Pittsburgh and 69 surrounding communities . . .

4-D Wrought Iron Pipe handles corrosive wastes

Pittsburgh Sewage Treatment Plant

Joint venture of Allegheny County Sanitary Authority Engineers and Metcalf and Eddy, Consulting Engineers, Boston, Massachusetts.

Installation: Wayne Crouse, Inc., Pittsburgh, Piping and Equipment
Sauer, Inc., Pittsburgh, Plumbing
Layne—New York Co., Inc., Pittsburgh, Downshafts

Architect: Celli-Flynn, McKeesport, Pennsylvania

Final welding on downshafts—Welders here complete transformation of ¾-inch 4-D Wrought Iron plates into 31-inch O.D. pipe. 4-D's self-fluxing action enables welders to easily produce sound, durable welds by any of the accepted welding methods. Elasticity of 4-D Wrought Iron prevents cracking during soil shifts or sudden jars in hauling.

Spray piping for sludge tank—Strung horizontally throughout nine sludge tanks are 270 lengths of 2-inch corrosion-resistant 4-D Wrought Iron Pipe. Spray nozzles, installed one foot apart, are tapped into each pipe run. Nozzles are set on 20-degree angles and aimed parallel to the sloped flush-down weirs.

in new Pittsburgh Sewage Treatment Plant

The new $80 million intercepting sewer and sewage treatment project in the Greater Pittsburgh area is about ready for business.

Built by the Allegheny County Sanitary Authority, the modern system will minimize sewage problems for 69 communities in the Pittsburgh district. The plant will handle 150 million gallons of raw sewage each day. This in turn will greatly reduce pollution in many parts of the Allegheny, Monongahela and Ohio rivers.

4-D WROUGHT IRON IN ALL THESE SERVICES

Hundreds of tons of corrosion-resistant 4-D Wrought Iron are involved in the processing of raw sewage at the new plant. Piping in sludge concentration tanks, chimney vents, tank car connectors and vertical downshafts, as well as force main, effluent, liquid chlorine, compressed air, waste, vent and conduit lines are all 4-D Wrought Iron.

Diameter of the 4-D Wrought Iron Piping ranges from 1-inch to 36-inch O.D.

HERE'S WHY THEY USED 4-D WROUGHT IRON

Wrought Iron's record of trouble-free service in demanding applications is well established. 4-D does its own job. Rarely needs costly protective coatings and wrappings. Successfully resists shock and vibration. Inherent elasticity prevents cracking. Long random lengths are available. So, fewer joints are required. Fewer hangers are needed. And 4-D Wrought Iron Pipe does not rely on excessive wall thicknesses to ward off corrosion.

SUMMING UP

Low cost per year of service is the sum and substance of these 4-D virtues. 4-D Wrought Iron lasts. Write for our booklet on sewage treatment and disposal installation. A. M. Byers Co., Clark Bldg., Pittsburgh 22, Pa.

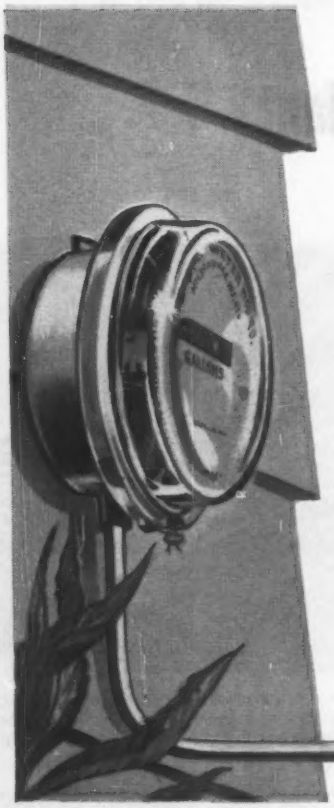
Aligning liquid chlorine lines—One-inch diameter extra-heavy 4-D Wrought Iron Pipe, leading to plant's chlorine room, receives proper alignment prior to final inspection. A service as corrosive as chlorine piping calls for the piping longevity of 4-D Wrought Iron.

Coffin for corrosion—This 25-inch diameter 4-D Wrought Iron downshaft (¾" wall) spells doom for aggressive elements contained in corrosive raw sewage. 4-D Wrought Iron's unique composition of glasslike iron silicate fibers entrained in pure base metal, blocks corrosion as soon as it starts.

BYERS 4-D WROUGHT IRON

TUBULAR AND FLAT ROLLED PRODUCTS

Corrosion costs you more than Wrought Iron



New! BADGER Read-o-Matic* REGISTER

adds speed-reading to water metering

Here is the industry's first practical outdoor register — the Badger Read-o-Matic. Now meter reading routes can be completed in half the time — with no more wasted calls. Plus other important benefits such as:

• *No more "lockouts"* • *No more in-house accidents* • *No more access problems* • *No more inconvenienced customers*

The new Badger Read-o-Matic means a modern meter reading system that your water department can have now — and opens a whole new realm of possibilities for the future. You'll want to read about them in our free new Badger Read-o-Matic folder.

*Pat. applied for in U. S. A. and foreign countries

Badger Meter Mfg. Co. • 4545 W. Brown Deer Rd. • Milwaukee 18, Wis.

Equipment News

CONTINUED FROM PAGE 23A

Rust and Scale Solvent

110

Necon Products, Division of Northeast Consultants, Inc., Framingham, Mass., have announced the release of a new rust and scale solvent that will dissolve most mineral scales including deposits of lime, magnesium, rust, sodium, plaster-of-paris and concrete. Yet, it will not affect pipes or steel surfaces.

Called Necon-101, the new solvent is a highly concentrated liquid which contains an especially prepared inhibitor. Its primary applications are for descaling tankless heaters, condensers, compressors, pipe lines, engine and casing blocks.

Plastic Pipe Packaging Unit

111

Evanite Plastic Co., Division of Evans Pipe Co., Carrollton, Ohio, has developed a new, Triangle Packaging Unit that enables one man to carry 100 feet of 4-inch plastic sewer pipe without using any other device or piece of equipment.

The new, packaging unit consists of ten 10-foot lengths of clear green

Evanite plastic pipe (the standard package) strapped together to form a triangle. Tests have shown that the unit is easy to handle on the job and in storage.

It was announced that the new unit is being used for all Evanite plastic pipe including sewer pipe, perforated drainage pipe, and portable water pipe, in diameters through 6-inch size.

Spectrophotometer Accessories

112

Coleman Instruments, Inc., Maywood, Ill., is offering micro accessories for use with their Junior Spectrophotometers in micro-chemical analysis where sample size is small and concentration is low. Precise spectrophotometric measurements are possible through a full 1.0 cm solution path in an arangement of only 0.7 ml.

The accessories include "Perfect Rounds" precision bore cuvettes of 10mm I.D. They are carefully selected and matched to 0.5% T., and are positioned in the monochromatic beam by Coleman Cuvette Adapter 6-106. They may be used either with or without the new Coleman Micro-Space Adapter. When used alone, they require a minimum sample volume of 1.8ml. The Micro-Space Adapter reduces the sample volume requirement to 0.7 ml but retains the desirable 1.0 cm path.

New Air Diffusion System

113

Chicago Pump Co., Chicago, Ill., has recently introduced the Hydroshear, an air diffusion system that provides clog-proof aeration, with high oxygenation and circulation at low air pumpage and power usage.

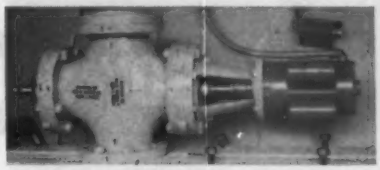
To obtain an effective aeration of sewage, fine bubble "Shearfuser" air nozzles or porous diffusers are used. For operating flexibility, the system is combined with Chicago's Swing Diffusers which have been used by sewage treatment plants for many years.

In operation, induced counter-flowing, air-liquid streams shear large air globules from the nozzles into fine bubbles. This causes an instantaneous oxygen transfer to the liquid because of the resultant turbulance and greatly increased air film surface. Fine bubbles from porous diffusers are re-circulated by counterflowing streams to greatly increase the total oxygen transfer due to sub-surface tank turbulence.

Explosion Type Sewage Grinder

114

McPherson, Inc., Tampa, Fla., has made available a sonic disintegrator and aerator designed to eliminate clogged sewers and unevenly loaded disposal fields.



The new unit both grinds and aerates the sewage. The grinding of normal sewage is largely accomplished by sonic impulses, at a frequency of 180,000 cycles, which disintegrates all digestible material into fine pieces.

Foreign objects not sonically disintegrated are mechanically ground through a ⅜" clearance by the McPherson explosion type grinding action. This mechanism may be compared to a rotary type power mower, in contrast to other sewage grinders whose action is like that of a reel type mower.

Chemical Metering Pump

115

Milton Roy Co., Philadelphia, Pa., offers the new Model CM chemical metering controlled volume pump for metering clear and corrosive liquids to chemical processes.

Extensively tested in both the laboratory and the field, the new pump delivers maximum capacities to 28 gph in simplex designs and twice that amount in duplex designs, which consist of two liquid ends with a common motor and base. It is constructed to handle pressures to 1,100 psi.

Flexibility of application is provided by screwed gland packing and a choice of materials used in construction. The plungers are interchangeable within the pump frame, and the units are readily convertible in the field from simplex to duplex capacity.

Stroke length, which is 1¼" at maximum, is adjustable from 0 to 100 percent of maximum, thereby changing the capacity for the full range of the pump. The capacity is regulated by a standard, manual T-slot adjustment of the plunger stroke while the pump is stopped.

The Model CM utilizes a standard drive of ½ hp. constant speed, electric motor through a right-angle gear reducer. Its motor is an open, drip-proof, single-phase, 115 volt, 60 cycle unit.

CONTINUED ON PAGE 29A

Here's the big news behind the industry's first practical outdoor register

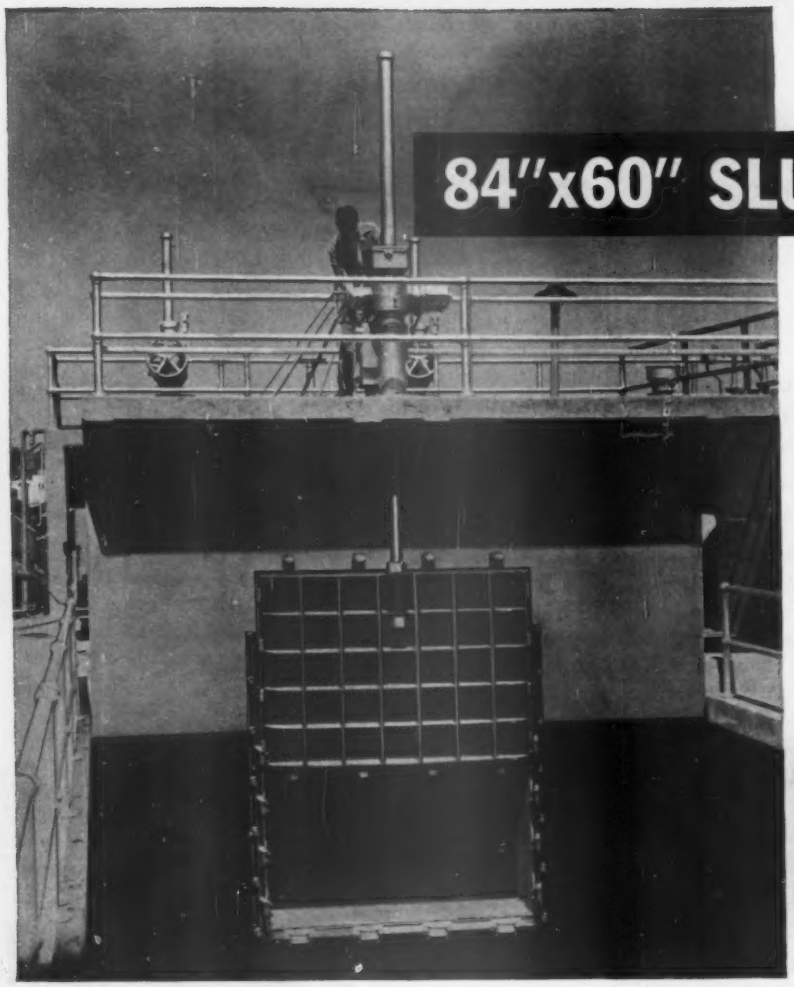
The Badger Read-o-Matic is powered entirely by the meter to which it is attached . . . works on an exclusive "pulse" principle. As water flows through the meter, the generator sends a pulse by wire to the Badger Read-o-Matic register outside for accurate recording.

Like our Badger meters, the Badger Read-o-Matic is precision-engineered — thoroughly tested by our trained water meter experts in the laboratory and in the field. Badger Meter products are the result of over 50 years of *specialized* water meter experience — products that excel around the world in accuracy, durability, dependability and low maintenance cost.

Send for free, colorful brochure that tells you all about the revolutionary Badger Read-o-Matic. For an actual demonstration, see your Badger representative or write us direct.

Badger Water Meters

Badger Meter Mfg. Co. • 4545 W. Brown Deer Rd. • Milwaukee 18, Wis.



® ARMCO STEEL CORP.

. . automatically operated by LimiTorque at Denver, Colorado Sewage Treatment Plant.

The Armco Sluice Gate shown is one of many designed for efficient, economical water control, by Armco Drainage & Metal Products, Inc., Middletown, Ohio.

LimiTorque is widely used for opening and closing Sluice Gates by push-button control, because it is absolutely dependable, accurate, safe and economical—under all operating conditions.

And, remember, more Valves of all types are opened and closed by LimiTorque than all others, in Water & Sewage Plants, Power Plants, Central Stations, Oil Refineries, Chemical Plants, Paper & Pulp Mills, and in Shipyards.

Write for LimiTorque Catalog L-550, and please use your Business Letterhead when requesting it.

THERE IS NO SUBSTITUTE FOR —

LimiTorque®

PHILADELPHIA GEAR CORPORATION

ERIE AVE. & G STREET, PHILADELPHIA 34, PENNA.

Offices in all Principal Cities

INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID AGITATORS • FLEXIBLE COUPLINGS

Limitorque Corporation • Philadelphia

Equipment News

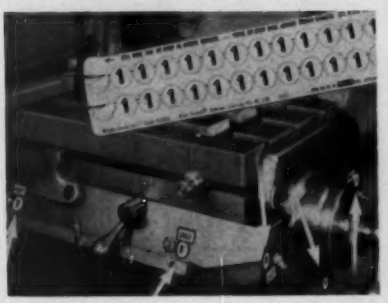
CONTINUED FROM PAGE 27A

Markers for Standardizing Lubrication

116

W. H. Brady Co., Milwaukee, Wis., has developed a convenient method of assuring regular and correct lubrication of machinery and equipment. The system utilizes self-sticking Brady Lube Labels to identify lubrication points, tell the type of lubrication to be used, and indicates the frequency of lubrication required by the particular piece of equipment.

The Lube Labels are furnished on Brady Blue Streak Dispenser Cards



and are ready for quick application adjacent to required lubrication points. No glue, water, chemical activators or paint are needed, and, once applied, the self-sticking labels stay firmly in place until purposely removed.

The labels are made from a vinyl material and are highly resistant to oil, grease and abrasion. The printing on the labels is sealed-in and protected by the company's exclusive Vyclad overcoating. Available in five, fadeproof colors, the labels' color-number combinations give lubrication engineers 50 codes to identify different greases, oils and fluids used in their plants.

Telemetering System for Remote Stations

117

Dualex Division of Bell & Gossett Company, Morton Grove, Ill., has designed a transistorized telemetering system for transmitting on-off indications from remote stations to a central location, using existing telephone lines or other audio circuits.

This new equipment enables a plant to operate a remote station without additional personnel, as the system transmits to the central office an audio signal which indicates equipment failure. A maintenance crew can then be immediately dispatched to correct the failure.

Operation of the system may be set for either "fail-safe", where the normal condition is indicated by tone presence and loss of tone indicates inoperation of equipment, or the opposite, where the absence of tone indicates normal operation and a tone signal indicates the equipment is running "off-normal".

The basic system employs from one to ten telemetering modulators whose tone outputs are transmitted over the telephone line to a telemetering demodulator. As many as twenty modulators and two demodulators may be used on a single telephone line.

Interference with normal telephone

CONTINUED ON PAGE 32A

THE V·NOTCH MEETS FUTURE DEMANDS, TOO

They tell us it's a growing America.

It is.

You know already you'll need to expand to keep pace with demand.

That's why the V-notch Chlorinator has such tremendous range. The precision shaped groove in a V-notch plug is made to control chlorine completely to one eight-hundredth of the maximum capacity of your machine. In fact, this is standard in some of the V-notch chlorinators.

Your W&T representative will help you size your V-notch chlorinator so that when your treatment needs step up—you simply snap in the next size rotameter.

Without buying a new machine, you get the same quick, accurate control in a new working feed range.

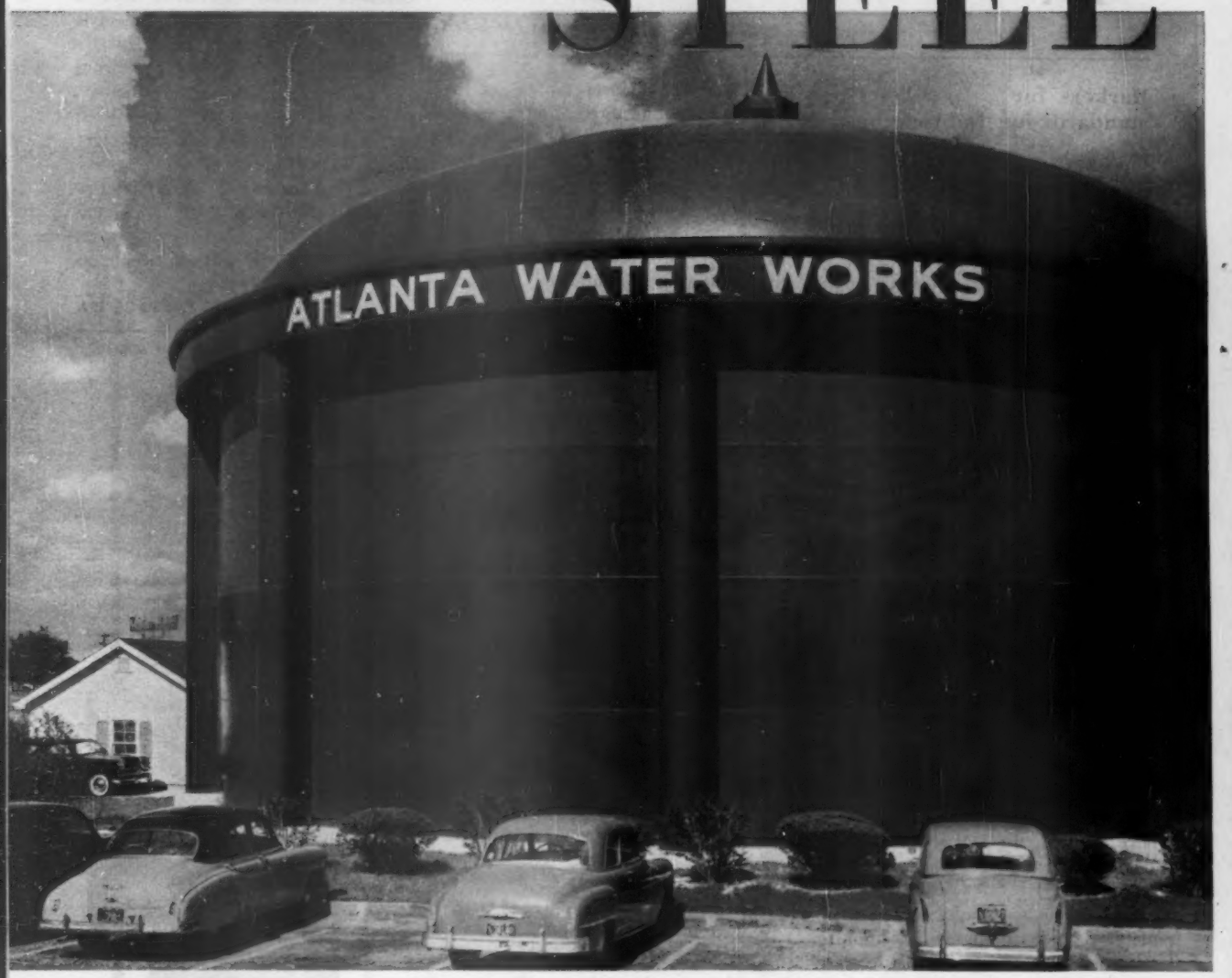
And, of course, the right plastics make the whole chlorinator chlorine-proof.

A booklet, "The V-notch Story" will tell you about all the W&T V-notch Chlorinator features. For your copy write Dept. S-133.94

WALLACE & TIERNAN INCORPORATED

25 MAIN STREET, BELLEVILLE 9, NEW JERSEY

THE STRENGTH OF STEEL



CB&I-built structures store 15,000,000 gallons

Providing first class water service to a city which triples in land area, through annexation, is not easy—but it can be done. The Atlanta, Georgia, Water Works did it with *two* remarkably engineered building programs, carried on simultaneously.

Atlanta kept its sleeves rolled up for five years to meet the two-way challenge: (1) expansion of the distribution system and (2) capital improvements to the existing system.

Two 2,000,000-gallon CB&I-built radial cone-bottom tanks were erected first to overcome the most pressing problem: *low pressure during periods of peak consumption.* Later, three CB&I-built ornamental reservoirs rose as milestones in the ambitious, fast-moving program. Upon completion of the program, CB&I-built structures were providing Atlanta with 15,000,000 gallons of storage.

Today, these steel reservoirs are proud landmarks of Atlanta's municipal achievement. Pleasing in appearance, durable and "bottle-tight", they offer sound testimony as to why *more water is stored in steel* than any other type of material.

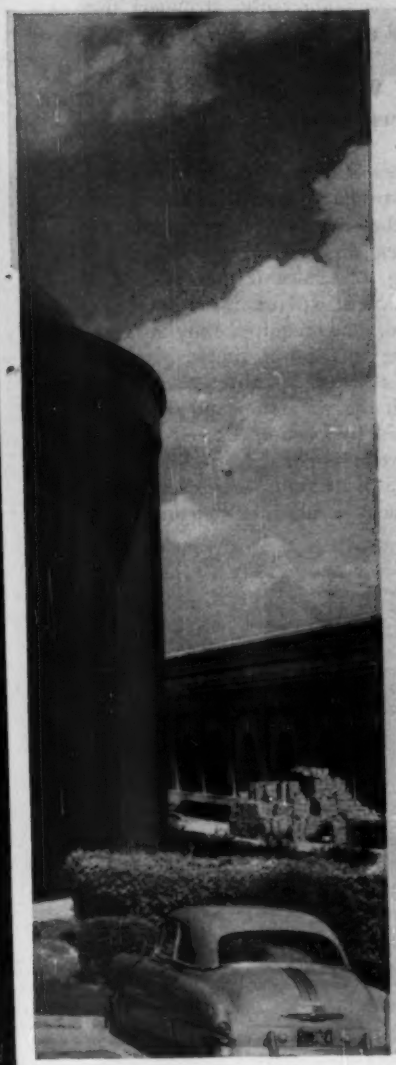
Write your nearest CB&I office for the bulletin: *CB&I Standpipes and Reservoirs.*

M56CB

Chicago Bridge & Iron Company

WATERSPHERES® • WATERSPHEROIDS® • ELLIPSOIDAL BOTTOM TANKS • RADIAL-CONES • SPHEROIDALS • STANDPIPES • RESERVOIRS • HORTONSPHERES® FOR GAS SERVICE

LANDMARKS $75,000,000 WATER SYSTEM



2,000,000-gallon ornamental wash water reservoir is 94 ft. in diameter. A CB&I-built 4,000,000-gallon reservoir also serves the Atlanta Water Works.

One of two CB&I 2,000,000-gallon radial cone tanks which help Atlantans save more than $1,000,000 in annual insurance premiums.

Above: This 5,000,000-gallon CB&I-built reservoir was described as "big enough to accommodate 1,000 automobiles."

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston • Kansas City (Mo.) • New Orleans
New York • Philadelphia • Pittsburgh • Salt Lake City • San Francisco • Seattle • South Pasadena • Tulsa
Plants in: BIRMINGHAM • CHICAGO • SALT LAKE CITY • GREENVILLE, PA. • NEW CASTLE, DELAWARE
In Canada: HORTON STEEL WORKS LTD., TORONTO, ONTARIO

Equipment News

CONTINUED FROM PAGE 29A

use is prevented by a band-rejection filter which is furnished for installation at each telephone. In operation, this filter blocks the tone frequencies but passes ringing and voice frequencies.

All-Steel Motor Reducer

118

Falk Corporation, Milwaukee, Wis., has extended its All-Motor Motoreducer line by adding the size 8E, thus substantially increasing the range of applications for the line, especially in the lower speed ranges.

This compact, high horsepower drive is designed for hard work and incorporates the features of the original All-Motor line. These are, all-steel housing, large overhung load capacity, positive lubrication, 98½% efficiency per gear mesh and extra depth, high presure angle gear teeth that are inherently stronger than helical teeth.

THE POPULATION BOMB

Economists and scientists refer to a rapid increase in the number of people as a "population explosion." U. S. population today is estimated at around 175 million and is increasing at the rate of about 7,500 each day—a new citizen every 12 seconds. Census experts expect U. S. population will be 250 million by the 1980's.

The basis of increased water use is an increase in consumers plus greater consumption per capita. U. S. is experiencing both. Total water use in the U. S. in 1900 was about 35 billion gpd. By 1950 it had increased to 200 billion, in 1959 it is 300 billion, and by 1975 it is expected to be well over 400 billion gpd.

A local water problem may involve insufficient quantity, poor quality and inadequate distribution. Federal, state and local officials and your water works superintendent know what to do. But they cannot do it without wholehearted public support.

This series is an attempt to put into words some appreciation of the water works men of the United States.

M&H VALVE AND FITTINGS COMPANY
ANNISTON, ALABAMA

ENGINEERED BY WALWORTH

New Water Seal Splices Fast

119

Gates Rubber Co., Denver, Colo., has introduced a new, rubber waterstop that can be spliced in just six minutes. Instead of requiring heat-sealing or vulcanization, the new Kwik-Seal splice is chemically bonded, and requires only a small splicing kit and a simple clamping device to effect a seal.

Both the waterstop and the splice are said to meet or exceed government requirements. Moreover, it retains a watertight seal even when movement occurs in a concrete joint.

As reported by Gates, the rubber stock used in Kwik-Seal waterstops is highest quality, having high tensile strength and elongation with a minimum of permanent set.

The new product may be used to prevent seepage and leakage whereever concrete is used to control or contain a water supply.

Small Dwelling Sewage Ejector

120

Smith and Loveless, Inc., Lenexa, Kansas, have announced the addition of its new, Uniject, compact pneumatic sewage ejector designed for use in small, single dwellings. This new product will handle capacities

CONTINUED ON PAGE 37A

Naugatuck KRALASTIC®

KRALASTIC saves up to 75% on jet and submersible pump piping

Here is a plastic pipe that not only costs less than metal piping, it's less expensive to install. KRALASTIC plastic pipe can be handled easily by one man—and installed in half the time required for metal. Fittings and pipe are available pre-threaded or can be easily joined by solvent welding. Pipe can be cut with an ordinary hacksaw.

KRALASTIC will not rust or corrode...is resistant to sulphur, electrolysis and other corrosive conditions. And KRALASTIC carries 25% more liquid than metal pipe. Its smooth inner wall means less friction loss...less bacterial action and mineral build-up—allowing for smaller diameter pipe.

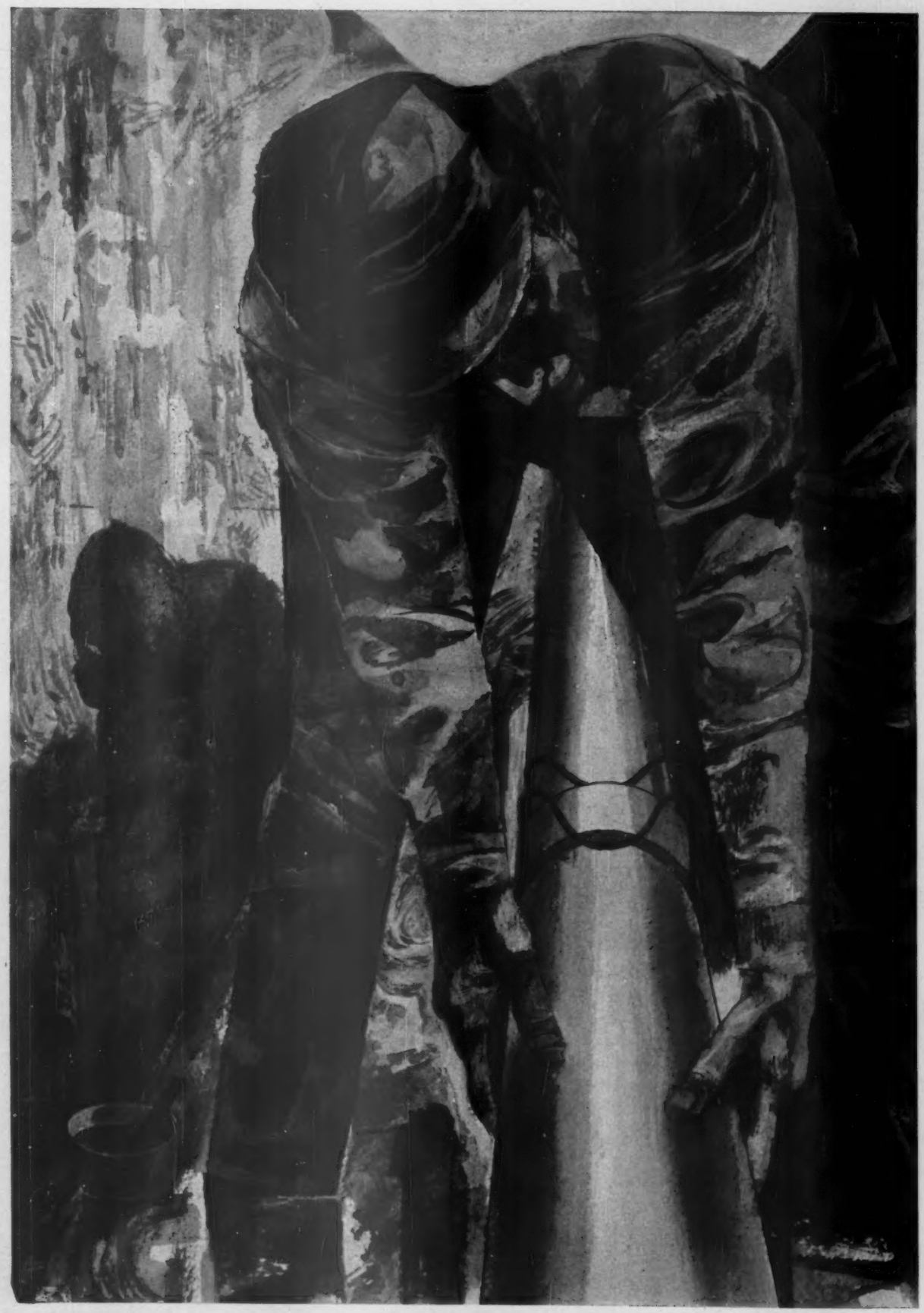
Write for information about the many other advantages of KRALASTIC, the time-saving, money-saving pipe for water well installations.

US RUBBER

United States Rubber
Naugatuck Chemical Division
154 K ELM STREET
NAUGATUCK, CONNECTICUT

KRALASTIC RUBBER-RESINS • **MARVINOL** VINYLS • **VIBRIN** POLYESTERS

Akron · Boston · Gastonia · Chicago · Los Angeles · Memphis · New York · Phila. · CANADA: Naugatuck Chemicals · Elmira, Ont. · Cable: Rubexport, N.Y.



K&M

ASBESTOS-CEMENT PRESSURE PIPE

Exclusive, patented FLUID-TITE Coupling that's 5 years ahead—connects in only two steps without heavy machinery!

Streamline installation . . . reduce costs and time . . . with modern "K&M" Asbestos-Cement Pressure Pipe.

To connect pipe to coupling, just lubricate the rubber gasket—and slide the pipe in! You can lay more pipe per hour than ever before, and do it under all weather and soil conditions—even in water and muddy trenches.

But, that's not all.

Tough, hardy "K&M" Asbestos-Cement Pressure Pipe is a miser concerning maintenance. It firmly holds down pumping costs, and sends maintenance costs tumbling. This durable-as-stone pipe won't corrode or tuberculate, and is completely immune to electrolysis. Permanently sealed joints remain water-tight always.

That's why communities from coast to coast have discovered that the low initial cost of top-quality "K&M" Asbestos-Cement Pressure Pipe is often the last cost.

What makes "K&M" Asbestos-Cement Pressure Pipe so special? Eighty-five years of asbestos engineering by one of America's pioneers in asbestos products. Put this wealth of experience to work for you. Write to us today.

The finest coupling in the industry! Exclusive, patented "K&M" FLUID-TITE Coupling connects in two easy steps. Seals tight and stays tight . . . no matter how high the pressure climbs. Rubber sealing gaskets are self-energizing. No cumbersome coupling puller is required. And, a 5° deflection per coupling, if you need it.

K·M
BEST IN ASBESTOS

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

ALL NEW OLIVER OC-9

the tractor that TALKS for itself!

with TRANS-O-MATIC drive

Check all these exciting new features in an on-the-job demonstration!

NEW! Counter-rotating tracks
OC-9 turns on its own axis! Shortest turn of any crawler. Gets in and out of tight spots fast. Exclusive with Oliver on this size tractor. Also, spot turns and gradual turns.

NEW! Torque converter
Pull or push twice the pay loads at slow speeds. Eliminates all clutching and gearshift guessing. Uses most effective horsepower.

NEW! Power shifting
Shift from forward to reverse instantly. No clutching, no clashing of gears with all-hydraulic transmission. Four speeds forward, 0 to 5.94 m.p.h. Four speeds backward, 0 to 7.92 m.p.h.

NEW! More efficient power
Get more work done more economically. New diesel engine with 62 gross h.p. plus new torque converter, gives you exceptional power efficiency.

NEW! Functional design
Truly modern from end to end, from the ground up. Easy-handling, finger-tip controls, with convenient power steering. Seat is offset for greater visibility. Oliver-matched equipment includes bull-dozer, angledozer, scarifier, winch and loader.

See for yourself what the husky, new OC-9 can do for you...how it'll step into those tough jobs and step up production. See your Oliver dealer for a convincing give-it-the-works demonstration and let the tractor do the talking!

All New OC-96 Crawler Loader

with low-profile design, greatest stability, maximum visibility. Completely Oliver-designed for high-speed digging and loading work. One-yard bucket. Has all the other features of the new Trans-O-Matic OC-9.

OLIVER

THE OLIVER CORPORATION
Dept. 2232, 400 W. Madison St., Chicago 6, Ill.

LOOK TO OLIVER FOR YOUR BEST BUY IN WHEEL AND CRAWLER TRACTORS

Equipment News

CONTINUED FROM PAGE 32A

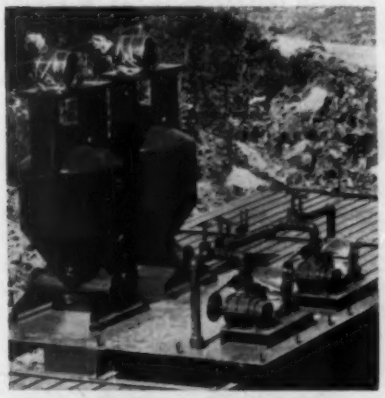
to 15 gpm at 20 foot TDH of low sewage flows and large solids.

The Uniject is a factory-built, automatic ejector especially suitable for installations where it is necessary to raise sewage to a gravity sewer line or an on-the-site treatment facility. It may thus eliminate lowering the entire sewer system, and the possibility of having to pump all the sewage as a result.

Pneumatic Ejector Serves as Lift Station

121

Smith and Loveless, Inc., Lenexa, Kansas, have recently made available its new Vac-O-Ject; a factory-



built pneumatic sewage ejector designed to handle capacities from 30 to 100 gpm. This product is a compact sewage lift station that combines the principle of vacuum intake and air pressure ejection, and is designed for simple installation.

The Vac-O-Ject can be installed as a separate, low-capacity, sewage lift station, or as an accessory lifting device for the Smith and Loveless Oxigest sewage treatment plant where gravity flow is impractical or impossible.

Electronic Solution Controller

122

Electro Mechanisms Corp., Skokie, Ill., has developed a new, automatic Electronic Solution Controller sys-

CONTINUED ON PAGE 38A

save
fittings, pipe joints and space

FORD RINGSTYLE* VALVES

Ford Ringstyle construction is a feature developed by Ford to attach the meter coupling nut to the service valve. This eliminates extra couplings, fittings and pipe commonly used in old style meter settings. Puts valve about 2" closer to meter, saving valuable space, particularly in a meter box.

Ford Ringstyle Valves for connecting to copper have beveled end built into basic design to eliminate cumbersome, loose washer. Fitting is threaded to take standard copper tube nut.

Ringstyle Valves are made in straight and angle patterns, of inverted-key and compression types and for iron and copper connection. Free samples available to water works men.

FORD
FOR BETTER WATER SERVICES
THE FORD METER BOX COMPANY, INC. Wabash, Indiana

VALVE OPERATION
DEAN TRUCK MOUNTED VALVE OPERATOR
MAKES EVERY VALVE POWER OPERATED
PAYNE DEAN & CO. CLINTON, CONN.

Equipment News

CONTINUED FROM PAGE 37A

tem for controlling concentration of caustic, acidic or aquaeous solutions.

The controller can be used with either continuous or batch-type chemical process systems, wash or bath equipment, or any application where precise concentrate levels must be maintained.

In operation, whenever the level of the concentrated solution in the holding tank falls below a preset point, a pump is automatically actuated and sprays a wash solution on the dry compound, or liquid concentrate, until the wash tank concentrate is again at the desired concentration level. The system is completely automatic since the wash tank solution is continuously circulated through a sensing electrode, and any variation in electrode output actuates the self-balancing control.

The equipment is manufactured to NEMA and JIC specifications. Its automation permits consistent product quality, elimination of periodic sampling of solutions, and increased safety against operating hazards.

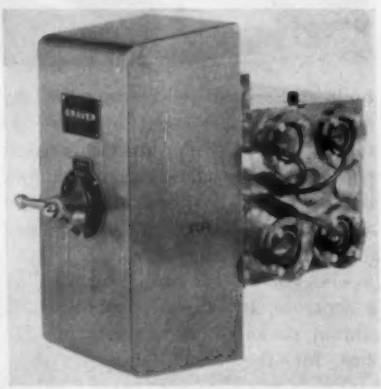
Single Control Valve

123

Graver Water Conditioning Co., New York, N. Y., has just introduced a patented single-control valve for directing the flow of liquids in zeolite softeners, ion exchange units and filters. Called the Monotrol, the valve is designed to perform the functions of a combination of individual valves while providing maximum ease in operation and maintenance.

This new unit is available in cast iron or in acrylic plastic for corrosive service, and can be operated manually or automatically. Features of the valve include pilot control and positive hydraulic pressure actuation. All internal moving parts can be readily removed for inspection and service without dismantling the connecting piping or removing the valve from the unit on which it is used.

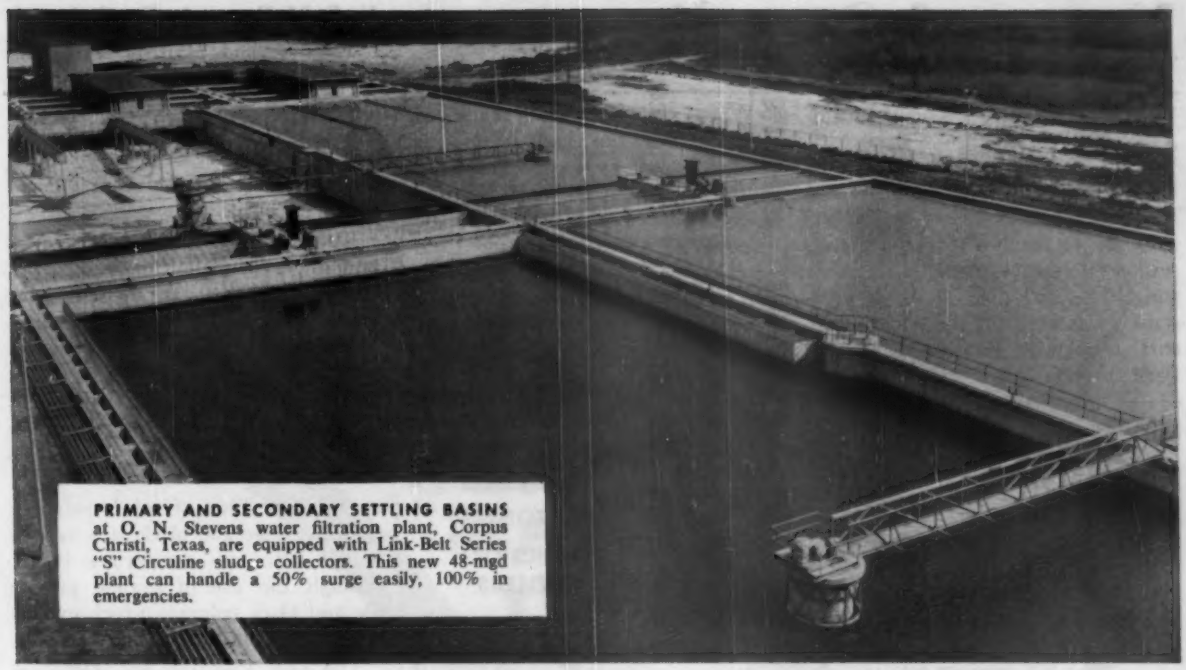
The cast iron unit has bronze pistons with teflon seating rings. Its pilot is also cast iron and incorporates teflon valve discs with bronze port plates, monel shafts and rubber "O" rings. The plastic valve requires no lining since the acrylic plastic



body is completely corrosion resistant.

Both types are shop assembled, tested and shipped with the manual or automatic pilot valve-mounted, so that the valve can be immediately connected the unit on which it is to be used. Conversion from manual to automatic operation can be made easily in the field.

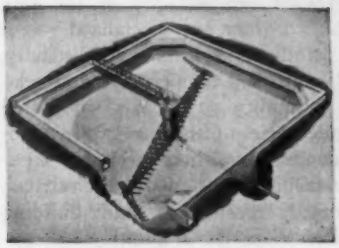
ALGAE-FREE WATER
MEANS
Copper Sulfate
treated water
Not only is Triangle Brand Copper Sulfate successful in controlling algae but it also is effective in killing some aquatic weeds. Since the weeds are submerged and disintegrated, there is no chance of them floating down stream to start new infestations, or to clog the waterway.
In sewage systems, Triangle Brand Copper Sulfate prevents roots and fungus from clogging pipes. However, there is no danger of affecting the surface trees owing to the low concentration of copper sulfate necessary to be valuable.
The new booklets "The Use of Copper Sulfate in The Control of Microscopic Organisms" and "Copper Sulfate for Root and Fungus Control in Sanitary Sewers and Storm Drains" will keep you up to date. Send for a copy today! Phelps Dodge Refining Corp., 300 Park Ave., New York 22, N. Y.
PHELPS DODGE REFINING CORP.
NICHOLS
CHEMICALS



PRIMARY AND SECONDARY SETTLING BASINS at O. N. Stevens water filtration plant, Corpus Christi, Texas, are equipped with Link-Belt Series "S" Circuline sludge collectors. This new 48-mgd plant can handle a 50% surge easily, 100% in emergencies.

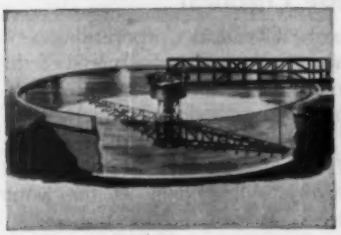
Four series of LINK-BELT Circuline collectors

offer positive sludge removal

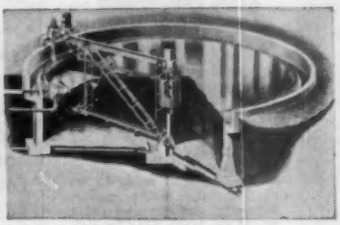


SERIES "S" — specially designed for square and rectangular tanks. As collector revolves, pivoted arms on ends of rakes adjust to thoroughly remove sludge from basin corners.

SERIES "R" — available in models for bottom feed, side feed or cross flow applications . . . in a wide range of sizes. Pitched blades gently convey sludge to center of tank.



SERIES "T" THICKENER — for rugged duty. Similar to "R" collectors except for heavier design. Furnished with fixed rake and automatic or manual lift types.



SERIES "C" — uses simple, positive traction drive to rotate bridge. Slow-speed straightline collector, with long-wearing, corrosion-resistant chains, removes sludge.

There's a design to fit any requirement of tank capacity or construction

THERE's no problem of septicity in settling tanks where Link-Belt Circuline collectors are used. Traveling smoothly and gently, they assure minimum disturbance of flow and the greatest possible concentration and removal of solids in least time.

This efficiency is typical of all the equipment in the complete Link-Belt line for water, sewage and industrial liquids treatment. And it testifies to the value of Link-Belt's more than 35 years' experience in sanitary engineering.

Link-Belt will gladly work with your consultants and chemists on *any* treatment problem. Call your nearby Link-Belt office. Send for Book No. 2546. 15,280

LINK-BELT

SANITARY ENGINEERING EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. Sanitary Engineering Regional Offices—Colmar, Pa., Chicago 9, Kansas City 8, Mo., San Francisco 24. District Sales Offices in All Principal Cities. Export Office, New York 7. Representatives Throughout the World.

News of Suppliers

1000th Unit by Smith & Loveless

Smith and Loveless, Inc., Lenexa, Kansas, recently celebrated the installation of the 1000th factory-built, sewage life station made by the company. The 250 gpm at 42 ft head station was built for the Aloma District residential estates in Winter Park, Florida.

When the unit was ready for shipment from the plant, an informal send-off ceremony was held in which more than 150 plant and office employees participated. Both company owners, B. Alden Smith and Compere Loveless, flew to Florida later that week to meet the station on its arrival and to take part in the christening ceremonies which preceded the installation.

PACIFIC
A TYPE FOR EVERY SERVICE
RUGGED — DEPENDABLE
NON-CLOG
SEWAGE PUMPS
DRY PIT - WET PIT
SUBMERSIBLE
HORIZONTAL
CHOICE OF IMPELLERS
NON-CLOG DRY PIT pump with double suction elbow and stand. Send for Bulletin 1850.5.
NON-CLOG WET PIT with cover. Single unit. Duplex models with alternating controls available. Send for Bulletin 1850.2.
PACIFIC NON-CLOG PUMP with motor, motor support bracket, suction elbow and stand. Send for Bulletin 1850.5.
HORIZONTAL NON-CLOG MODEL with flexible coupling. Send for Bulletin 1850.5.
Outstanding performance and long trouble-free service from every type. Pacific Non-Clog Sewage Pumps combine all desirable design features that assure efficient, economical and dependable operation and service.
Order now. ALL TYPES AVAILABLE FOR IMMEDIATE SHIPMENT.
SUBMERSIBLE NON-CLOG
A complete unit ready to install includes pump, motor, automatic controls and cable to control panel. Send for Bulletin 1850.5.
PACIFIC PUMPING CO.
Established 1907
Manufacturers and Distributors of Pumps for Every Service
MAIN OFFICE AND FACTORY: 9301 San Leandro St., Oakland 3, Calif.
OAKLAND, Calif. • Portland, Ore. • Seattle, Wash. . Los Angeles, Calif. . Dallas, Texas

K & M Expands Facilities

Keasbey and Mattison Co., Ambler, Pa., marked the completion of the first phase of a major expansion program with the opening of their new Headquarter's Office building and new Research and Development Center.

The two-floor Headquarters office building is completely air conditioned, and its 20,000 square feet of floor space houses K & M's executive, financial, purchasing and statistical

activities. The official company colors, orange and black, are incorporated into the structure itself through the use of orange mosaic tile and black columns which extend vertically at intervals along the wall.

The new Research and Development Center is considered to be one of the most modern facilities of its kind in the industry. It has more than 11,000 square feet of floor space which will contain departments devoted to asbestos, asphalt, and heating insulating product research and development.

Among the features of the new R & D Center are specialized rooms for studying thermal conductivity, and controlled temperature and relative humidity rooms for simulating a wide variety of climatic and weather conditions. There are also separate facilities designed for electrical, chemical, mechanical and building product research, in addition to separate laboratories for individual product research.

American Zeolite Now Ionac Chemical

Ionac Chemical Corporation, New York, N. Y., is the new name of the former American Zeolite Corporation, a 35-year old manufacturer of ion exchange resins, water softening and filtering media. Offices of the company will remain at the same address.

The company explained the change as a logical step since the company is best known by its product's tradename, Ionac. The firm will continue to market the complete line of Ionac

CONTINUED ON PAGE 46A

fast installation in existing piping!

MUELLER® COPPER METER YOKES

Now, Compression Couplings are available for Mueller Copper Meter Yokes with Multi-purpose Ends.

These new, time-saving couplings can be quickly installed in any existing piping without cutting threads or sweating joints. Simply cut a short section from the pipe, slip the compression couplings over the ends of the pipe, assemble the yoke to the couplings and tighten the compression coupling nuts.

Compression couplings can be furnished for steel pipe or copper pipe in both the regular compression nut design or the locking nut designs shown. The locking nut type positively prevents any movement of the yoke on the pipe and insures continuous electrical bonding of the service line.

The addition of these four new end couplings greatly increases the versatility of Mueller's proven Multi-purpose End Connections.

Write for complete information and specifications.

This simplified system of installing copper meter yokes is a typical result of the constant attention to detail and more than a century of experience in research, design, engineering and manufacturing that is an integral part of all Mueller fittings and equipment.

Copper Meter Yokes are just a portion of Mueller's complete system of quality-matched water distribution products.

NEW!

Compression Coupling with locking nut for steel pipe (Regular nut available)

NEW!

Compression Coupling with locking nut for copper pipe (Regular nut available)

Combination Tailpiece with inside I.P. Thread for steel pipe and flared connection for copper pipe.

Body Coupling Nut for copper pipe.

Tailpiece with outside I.P. Thread.

MUELLER CO.
DECATUR, ILL.

Factories at: Decatur, Chattanooga, Los Angeles
In Canada: Mueller, Limited; Sarnia, Ontario

METALLURGY TESTS

HYDROSTATIC TEST PRESS

APCO

LOAD BEARING TESTS

NOTHING OVERLOOKED!

Produced in a plant as modern as tomorrow . . . Most exacting metallurgical, chemical and physical tests . . . Strict quality control from the raw material to the finished product . . . That's Alabama's Super De Lavaud Cast Iron Pipe.

For long years of dependable, trouble-free service . . . specify Alabama's Super De Lavaud Cast Iron Pipe. Sizes 3″ to 24″ in modern long lengths. Bell and Spigot, Roll-on-Joint, Flanged, and Mechanical Joint.

ALABAMA PIPE COMPANY

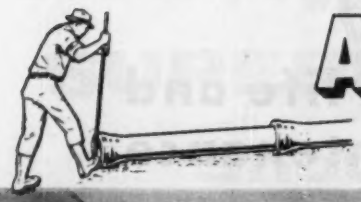
General Sales Offices

ANNISTON, ALABAMA

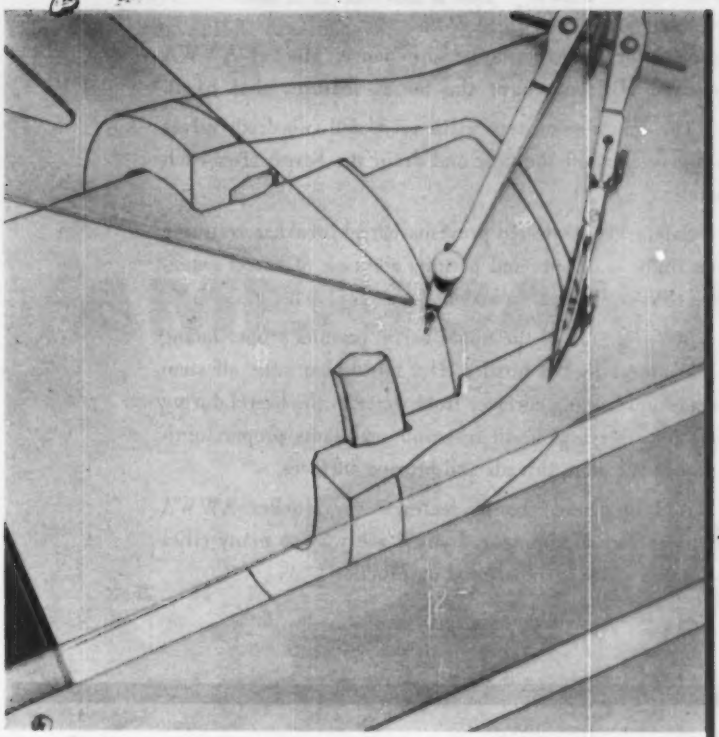
We Invite Inquiries to Our Nearest Sales Office

122 South Michigan Ave., Chicago 3, Ill.
350 Fifth Ave., New York 1, N. Y.
950 Dirks Building, Kansas City, Mo.
18505 W. Eight Mile Rd., Detroit 41, Mich.
5335 Southern Ave., South Gate, Calif.

For The Best Connection You'll Ever Make—



ALTITE JOINT® By APCO



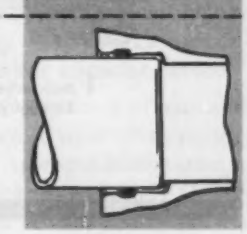
Four Operations
As Simple As Falling Off a Log—

Insert Rubber gasket in bell end of pipe — you can't put it in wrong — A child can do it.

Wipe on a small amount of special lubricant—This reduces friction.

Insert plain beveled end of pipe — there are no grooves, ridges or tips on gasket to interfere with smooth insertion.

Small amount of pressure required to force plain end to bottom of socket—Your simple, time saving joint is completed.



Efficient, Economical and Fool Proof—

The **ALTITE JOINT®** has been subjected to a series of rigid tests much more severe than are encountered under the most extreme installation and service conditions in the field. Even under extreme conditions, this joint is so simple to install—you could hardly go wrong if you tried.

ALABAMA PIPE COMPANY

General Offices—ANNISTON, ALABAMA

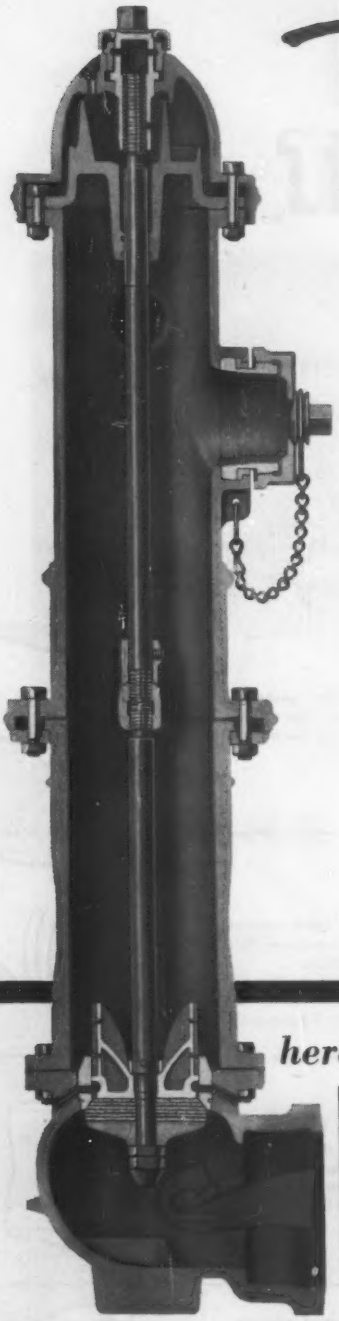
SALES OFFICES

122 South Michigan Ave., Chicago 3, Ill.
350 Fifth Ave., New York 1, N. Y.
950 Dirks Building, Kansas City, Mo.
18505 W. Eight Mile Rd., Detroit 41, Mich.
5335 Southern Ave., South Gate, Calif.

For Efficiency, Economy and Simplicity—

Order ALTITE For Your Next Job

Underwriters Approved
Patent Applied For.



Bonus features

for long life and easy maintenance

Designed for above ground maintenance, Mueller AWWA Improved Hydrants have the bonus features that *count.*

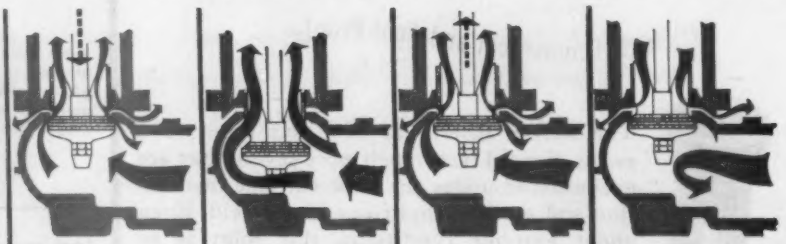
The compression-type main valve and two drain valves positively shut off the flow and drain the barrel after each operation.

Safety Flange design prevents barrel breakage resulting from traffic accidents and permits addition of barrel extensions to raise hydrant in keeping with grade changes.

360° rotation of the upper barrel permits proper facing of the breech-locked nozzles. Dry-top design seals all stem threads and bearing surfaces from water in the barrel during operation. A refillable oil reservoir maintains proper lubrication of the stem threads and bearing surfaces.

Add up these "bonus features" in Mueller AWWA Improved Fire Hydrants and you'll see why so many cities and towns have "Standardized on Mueller".

here's how the MUELLER *main valve works:*



1 Main valve fully closed. Barrel dry.

2 Hydrant opening. During first few turns of operating nut, full water pressure flushes drain ports.

3 Hydrant fully opened. Drain ports closed by sealing surfaces on main valve guides.

4 Hydrant closing. Drain ports again force-flushed by full water pressure during last few turns of operating nut.

5 Hydrant fully closed. Water draining from barrel through open ports.

For complete information and specifications, write direct to:

MUELLER CO. since 1857 SERVING the Waterworks Industry QUALITY

MUELLER CO.
DECATUR, ILL.

Factories at: Decatur, Chattanooga, Los Angeles; In Canada: Mueller, Limited, Sarnia, Ontario.

What Every WATER SUPERINTENDENT Should Know About

AMERICAN METERS

... Service

BY FACTORY TRAINED REPRESENTATIVES

American Waters Meters are backed by the kind of service that only factory trained representatives with many years of experience in water works operations can render. Whether it's a problem of meter selection or a mechanical question in the repair department, you will find American Meter representatives extremely cooperative and well prepared to give helpful information or practical instructions. To the service man, they will be glad to demonstrate time-saving methods that reduce costs and maintain meter accuracy.

Whenever problems become too technical, they are referred to the factory engineers, the men who have helped to design American Meters. They are ready to give expert help to any water works superintendent whenever needed.

Complete information on the many cost saving features of American Meters are contained in Bulletin 58. A copy will be gladly mailed to you on request.

BUFFALO METER COMPANY

INCORPORATED

2909 Main Street • • Buffalo, New York

News of Suppliers

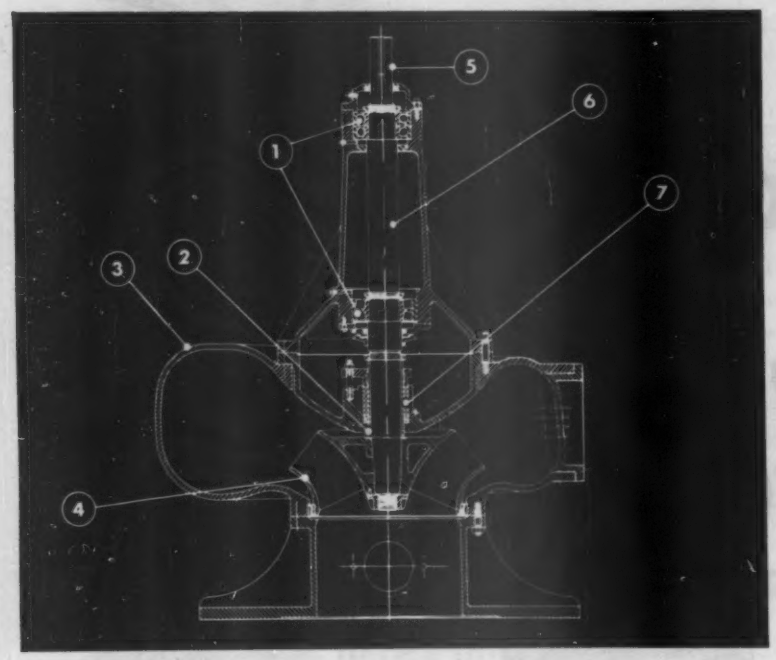
CONTINUED FROM PAGE 40A

cation exchangers and specialty products for specific fluid treatment problems.

Evans to Build Plastic Pipe Plant

Evanite Plastic Co., subsidiary of the Evans Pipe Co., Uhrichsville, Ohio, has announced the purchase of a 30-acre industrial site in Leesburg, Florida, for the construction of a plastic pipe plant. The new factory is expected to be in operation February 1, 1960. Its estimated cost is in excess of $200,000.

A company spokesman disclosed that "the Florida plant will be a plastic extrusion facility and will manufacture, primarily, 8-inch plastic sewer main and 4 and 6-inch plastic house sewer connections." The new plant is expected to help in the industrial and housing developments of Florida and its neighboring states.



Which features are biggest down-time savers in big sewage pumping jobs?

Wheeler-Economy says these features of its Mixed Flow Volute Pumps will be on anyone's list. See if you don't agree.

1. BALL AND ROLLER BEARINGS with heavy-duty thrust bearing located atop bearing bracket.

2. EASILY-ACCESSIBLE ROTOR reduces down-time for maintenance.

3. HIGH-STRENGTH CASING is close-grained cast iron. Steel or special alloys furnished to meet special conditions.

4. IMPELLER is bronze, cast iron or alloy suitable for the service. Wearing Rings are easily renewable.

5. FLEXIBLE COUPLING is located between the Pump and the Motor.

6. HEAT-TREATED ALLOY STEEL SHAFT is extra large for added strength and is precision ground and polished.

7. STUFFING BOX is unusually deep to hold adequate packing and is easily accessible for replacing packing. It can be fitted with cage or lantern ring for flushing when pumping gritty liquids.

8. VERTICAL OR HORIZONTAL mounting can be furnished.

Write for Catalog F-102, for complete information on sewage pumps with 3000-150,000 gpm. capacities

Economy Pump Division

C. H. WHEELER MFG. CO.

19th and Lehigh Avenue • Philadelphia 32, Pa.

Whenever you see the name C. H. Wheeler on a product, you know it's a quality product

Centrifugal, Axial and Mixed Flow Pumps • Steam Condensers • Steam Jet Vacuum Equipment • Marine Auxiliary Machinery • Nuclear Components

Kampf Receives Neptune Meter Appointment

Neptune Meter Company, New York, N. Y., has named Harry E. Kampf, formerly Chief Engineer in charge of water meters, to be Chief Engineer of the company's Liquid Meter Division.

Kampf joined Neptune in June 1933 as a project engineer. He was made Staff Assistant to the Manager of Engineering in 1950, and in 1956 was made Chief Engineer of water meters. During this time, he has become well-known in the industry for his work on meter standards with the American Water Works Association.

Krstich Joins Denver Equipment

Denver Equipment Co., Denver, Colo., has announced the appointment of Walter J. Krstich as sales engineer to work in the Western Sales Division covering its eleven states. Mr. Krstich is a graduate of the U. S. Navel Academy at Annapolis.

Prior to joining Denver Equipment, he worked for the Goodyear Rubber Company as a field representative in their Industrial Products Division for eight years.

Elder Receives New Appointment

Aurora Pump Division, New York Air Brake Co., Aurora, Ill., has announced the appointment of Raoul D. Elder as Division Sales Manager of the Division. He succeeds John M. Bals who has recently been named General Manager.

Mr. Elder joined Aurora Pump in 1953 after serving with the U. S. Air Forces. He attended Northwestern University and is a native of Aurora.

CONVENTIONAL 18-FOOT CAST IRON PRESSURE PIPE

GRIFFIN-20 COUNCIL BLUFFS

10% FEWER JOINTS!

CUT PIPE INSTALLATION COSTS WITH GRIFFIN 20*

CAST IRON PRESSURE PIPE IN 20-FOOT LENGTHS!

"Give us longer pressure pipe lengths to help hold down rising labor costs involved in pipe installation!"

That was the overwhelming demand of water works operators, city engineers, consultants, and piping contractors in the Plains States, according to market surveys conducted by the Griffin Pipe Division of Griffin Wheel Company.

To answer this need, Griffin has developed the Griffin-20 . . . a complete line of 20-foot cast iron pressure pipes in the popular 4- to 12-inch diameter size range. Compared to conventional 16-foot and 18-foot lengths, this modern 20-foot length means *over 10 percent fewer joints* . . . and *that* means that less time is required to install Griffin-20 cast iron pressure pipe!

Griffin is the first American foundry to manufacture cast iron pressure pipe in 20-foot lengths, cast by the Delavaud process in this popular size range. A complete selection of pipe joints is offered, including the patented Bell-Tite *slip-on*, *mechanical joint*, and *bell and plain end*. All pipe will be either cement-lined to full specification thickness, or half thickness, as required.

Not only will the new *length* save money for cast iron pressure pipe users throughout the Midwest . . . the strategic location of the Griffin Pipe plant at Council Bluffs will also effect substantial savings in *shipment* time and money!

Take advantage of all these economies. The *next* time you have a cast iron pipe installation . . . *contact Griffin!*

*"Griffin-20" is a trademark of Griffin Wheel Company

Griffin is constructing a new million-dollar pipe research center in Bensenville, Illinois. Griffin founded in 1879, has 11 plants, and has poured more than 15 million tons of iron.

GRIFFIN PIPE

DIVISION
GRIFFIN WHEEL COMPANY
COUNCIL BLUFFS, IOWA

GRIFFIN PIPE DIVISION COUNCIL BLUFFS

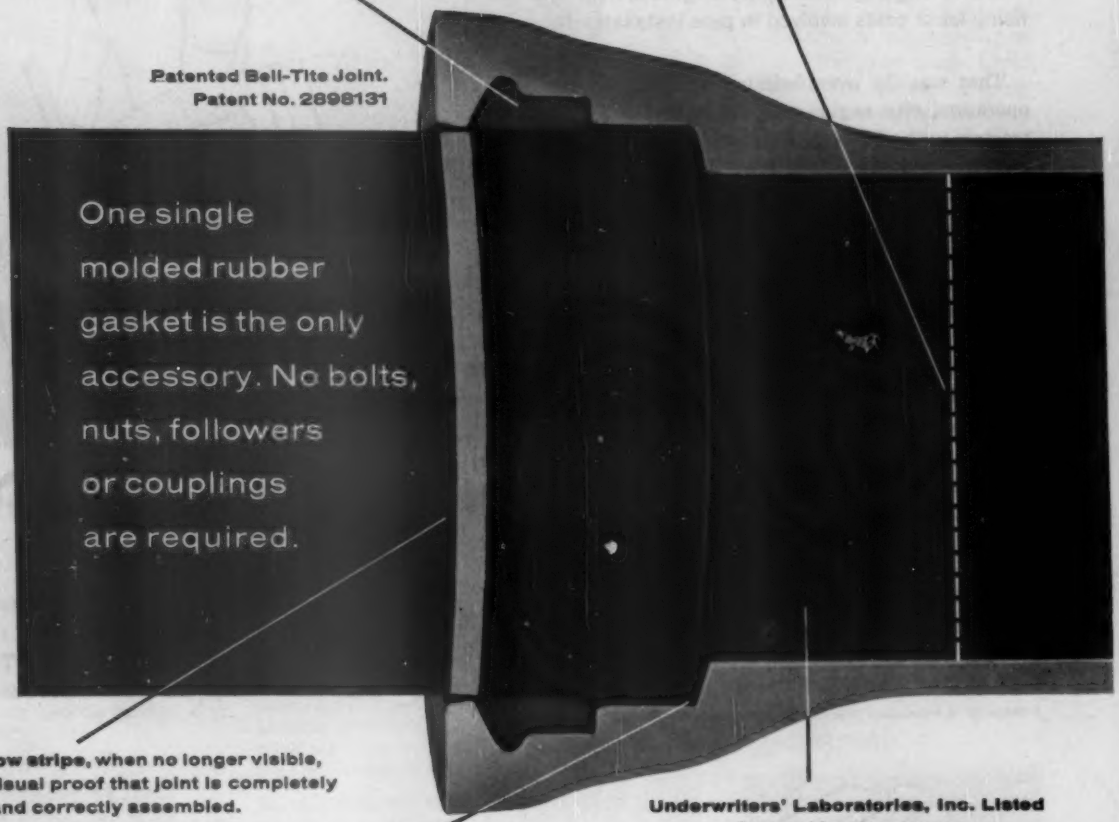
CLOW

Quick, Bottle-Tight Seal

Large, thick section gasket of long-life high durometer rubber forms pressure-tight seal.

Bell-Tite Joint Pipe available in diameters from 3" thru 24" in 18 foot lengths.

Patented Bell-Tite Joint. Patent No. 2898131



This yellow stripe, when no longer visible, provides visual proof that joint is completely and correctly assembled.

Underwriters' Laboratories, Inc. Listed for working pressures up to 350 psi.

Ample deflection to meet casual curves or grades is provided by space in socket of the bell.

CLOW CAST IRON PIPE

Cast Iron Pipe Plants at

BENSENVILLE, ILLINOIS • BIRMINGHAM, ALABAMA • COSHOCTON, OHIO

CAST IRON PIPE

You can install

CLOW BELL-TITE® JOINT PIPE

as fast as you can dig a shallow trench

Pictures show CLOW 20" Bell-Tite Joint Cast Iron Pipe being installed to provide water for a midwestern industrial development. CLOW Bell-Tite Joint Cast Iron Pipe was selected because of its proved long life and the ease and speed of installation. Hulett Corporation, contractors.

LOWER
pipe into trench

SWING
into open bell

SEAL for
pressure-tight
joint

JAMES B. CLOW & SONS, INC.
201-299 North Talman Avenue, Chicago 80, Illinois

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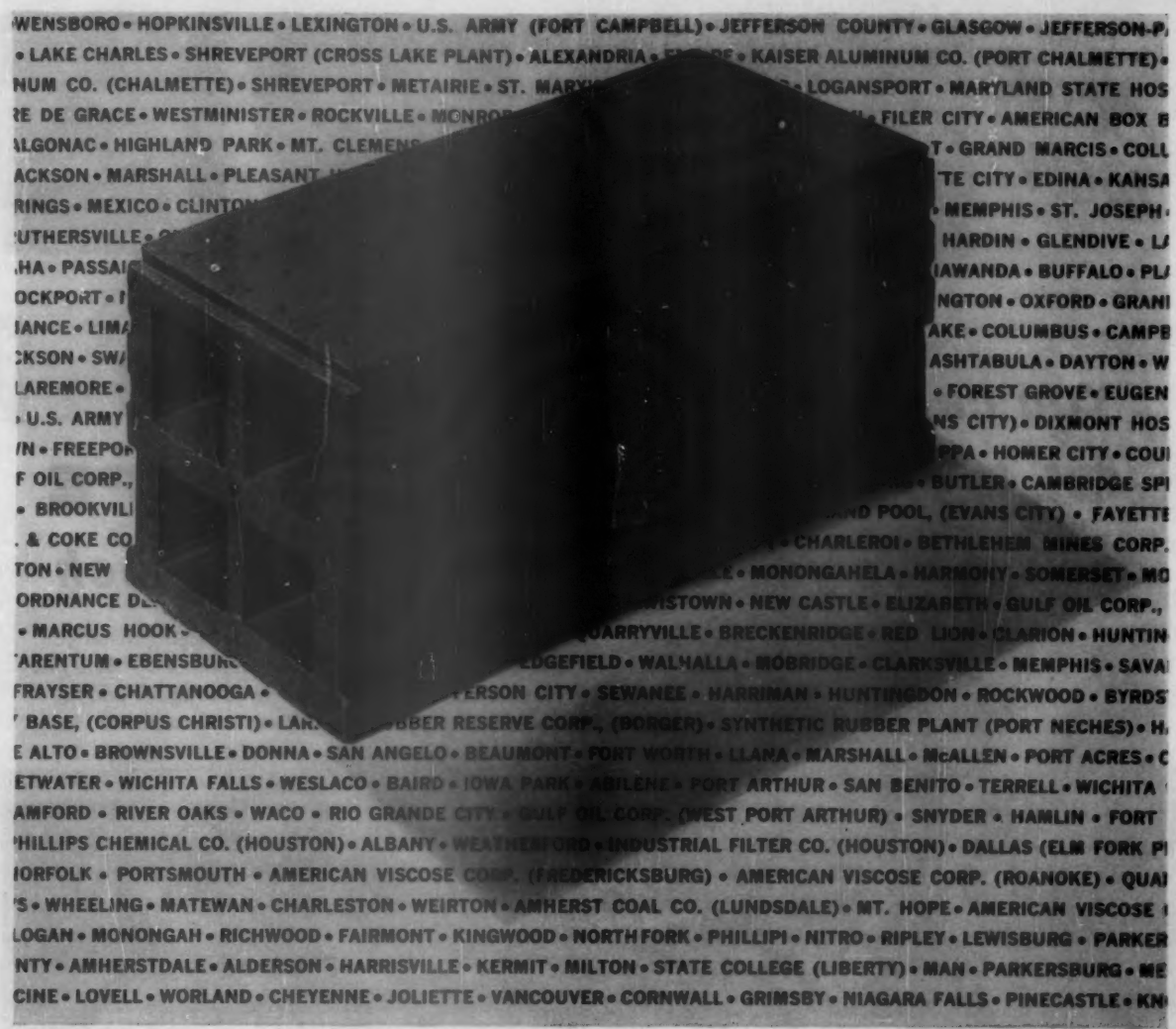
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RINGS • MEXICO • CLINTO • MEMPHIS • ST. JOSEPH •
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CKSON • SWA • ASHTABULA • DAYTON • W
LAREMORE • • FOREST GROVE • EUGEN
• U.S. ARMY • NS CITY) • DIXMONT HOS
IN • FREEPO • PPA • HOMER CITY • COU
F OIL CORP., • BUTLER • CAMBRIDGE SP
• BROOKVIL • ND POOL, (EVANS CITY) • FAYETTE
. & COKE CO • CHARLEROI • BETHLEHEM MINES CORP.
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ORDNANCE D • ISTOWN • NEW CASTLE • ELIZABETH • GULF OIL CORP.,
• MARCUS HOOK • QUARRYVILLE • BRECKENRIDGE • RED LION • CLARION • HUNTIN
ARENTUM • EBENSBUR • EDGEFIELD • WALHALLA • MOBRIDGE • CLARKSVILLE • MEMPHIS • SAVA
FRAYSER • CHATTANOOGA • ERSON CITY • SEWANEE • HARRIMAN • HUNTINGDON • ROCKWOOD • BYRDS
BASE, (CORPUS CHRISTI) • LA BBER RESERVE CORP., (BORGER) • SYNTHETIC RUBBER PLANT (PORT NECHES) • H
E ALTO • BROWNSVILLE • DONNA • SAN ANGELO • BEAUMONT • FORT WORTH • LLANA • MARSHALL • McALLEN • PORT ACRES • C
ETWATER • WICHITA FALLS • WESLACO • BAIRD • IOWA PARK • ABILENE • PORT ARTHUR • SAN BENITO • TERRELL • WICHITA
AMFORD • RIVER OAKS • WACO • RIO GRANDE CITY • GULF OIL CORP. (WEST PORT ARTHUR) • SNYDER • HAMLIN • FORT
PHILLIPS CHEMICAL CO. (HOUSTON) • ALBANY • WEATHERFORD • INDUSTRIAL FILTER CO. (HOUSTON) • DALLAS (ELM FORK P
IORFOLK • PORTSMOUTH • AMERICAN VISCOSE CORP. (FREDERICKSBURG) • AMERICAN VISCOSE CORP. (ROANOKE) • QUA
'S • WHEELING • MATEWAN • CHARLESTON • WEIRTON • AMHERST COAL CO. (LUNDSDALE) • MT. HOPE • AMERICAN VISCOSE
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CINE • LOVELL • WORLAND • CHEYENNE • JOLIETTE • VANCOUVER • CORNWALL • GRIMSBY • NIAGARA FALLS • PINECASTLE • KN

These ~~464~~ plants* know . . . (495) *the list keeps growing!*

How to get to the bottom of backwash problems

The best way is to install Leopold Glazed Tile Filter Bottoms, just as all these plants have done.

Like them, you'll find Leopold Bottoms successfully meet all underdrain requirements. The individual Leopold blocks can't corrode or absorb water . . . are acid and alkali resistant . . . are not subject to tuberculation . . . and provide equal filtration and uniform wash distribution. In addition, because Leopold Bottoms won't wear out and assure minimum media maintenance, they are the most economical in the long run.

We'll be glad to supply facts and figures without obligation.

**Including over 100 rehabilitation projects*

F. B. LEOPOLD CO., INC.
ZELIENOPLE, PA.

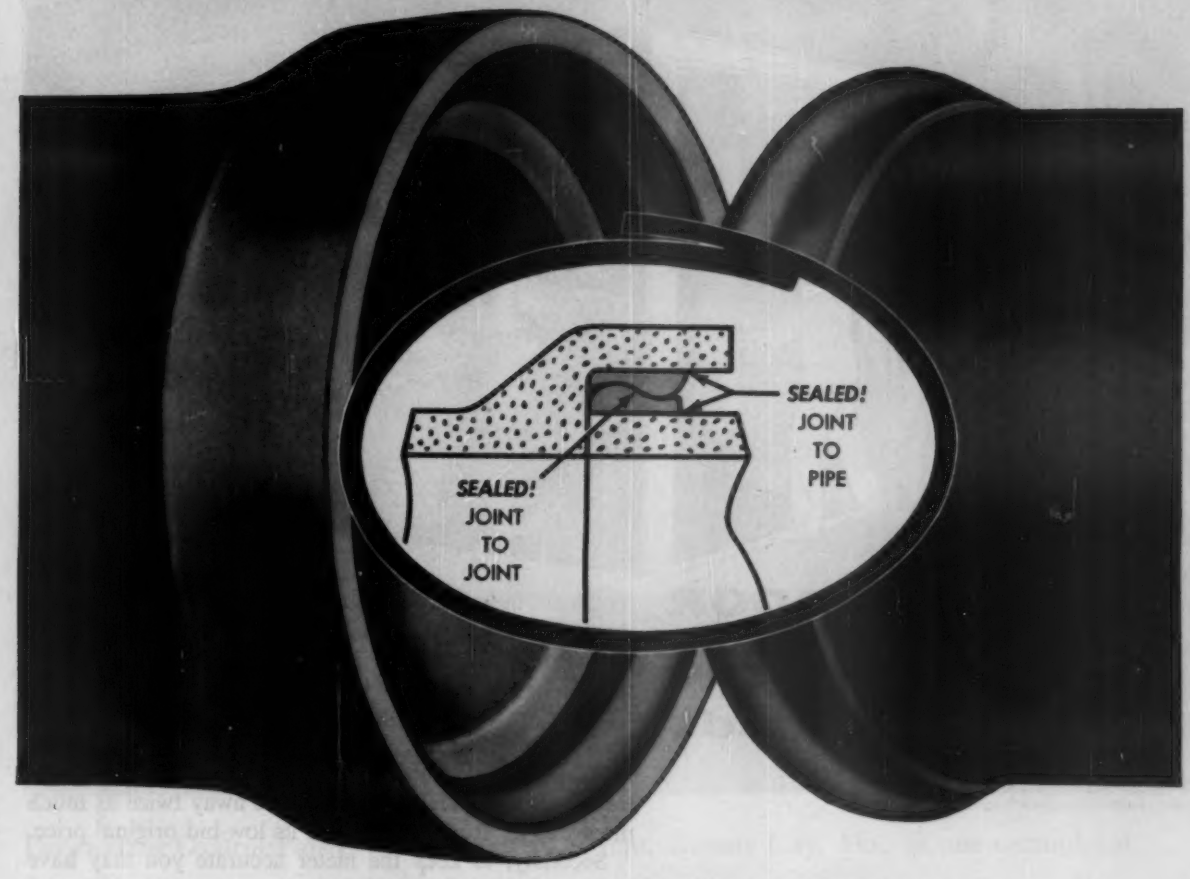
Exclusive Canadian Representative: W. J. Westaway, Ltd., Hamilton, Ont.

Leopold

FILTER BOTTOMS • BUTTERFLY VALVES • WASH TROUGHS • DRY CHEMICAL FEEDERS • OPERATING TABLES AND CONTROLS
MIXING EQUIPMENT • FIBERGLASS • BAFFLES AND WEIR PLATES

Wedge-Lock®

HANDLES INFILTRATION!



ROOT-TIGHT SEAL!

Patented Wedge-Lock Joints are bonded to Vitrified Clay Pipe—*at the factory*—to bring you the highest performance standards . . . the lowest installation costs.

One simple, easy operation and the joint's tightly sealed around the full pipe circumference . . . stays in continuous compression for the life of the pipe. When you specify Wedge-Lock, you reduce infiltration and resist root problems before they start . . . keep installation costs down . . . benefit from the guaranteed performance of the world's longest-lasting pipe.

MINIMUM INFILTRATION!

Write to listed manufacturers for literature or an actual Wedge-Lock demonstration

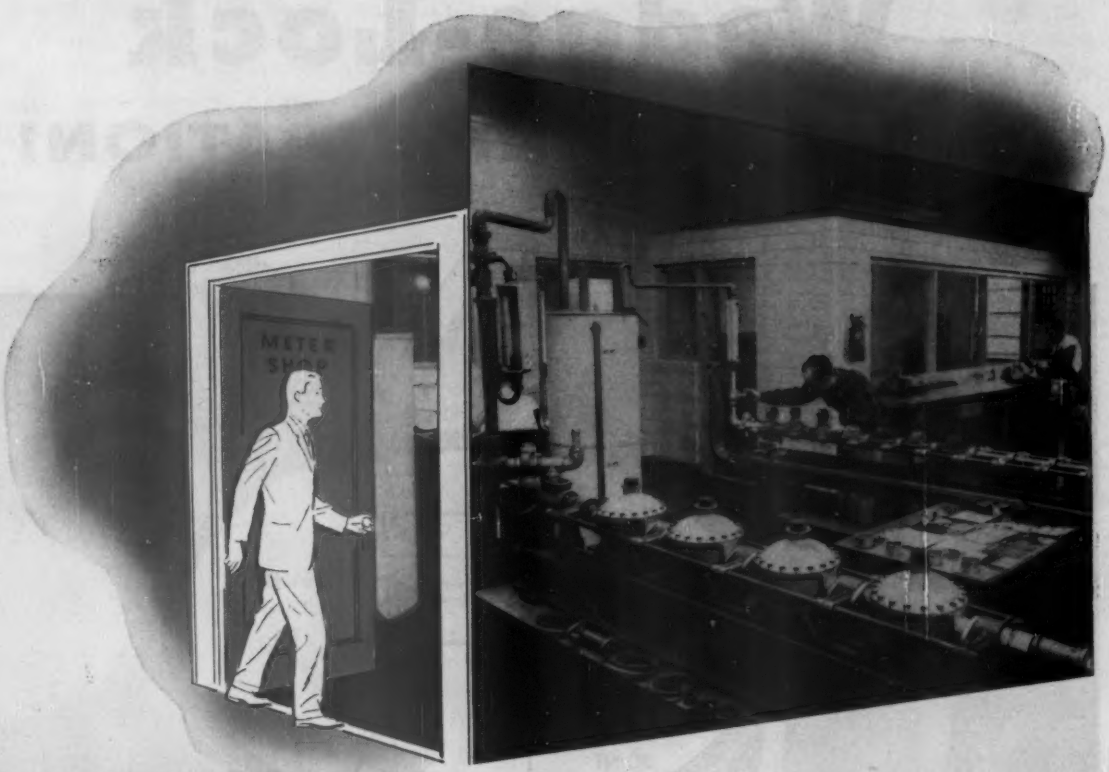
Wedge-Lock CLAY PIPE

THE FACTORY-JOINTED CLAY PIPE AVAILABLE NATIONALLY FROM LOCAL MANUFACTURERS

Order Wedge-Lock from any of these Vitrified Clay Pipe Manufacturers:

Cannelton Sewer Pipe Company..Cannelton, Ind.
The Clay City Pipe Company....Uhrichsville, Ohio
The Evans Pipe Company.....Uhrichsville, Ohio
Graff-Kittanning Clay Products..Worthington, Pa.
Larson Clay Pipe Company.....Detroit, Mich.
The Logan Clay Products Company..Logan, Ohio
The Robinson Clay Product Co......Akron, Ohio
The Stillwater Clay Products Co...Cleveland, Ohio
Superior Clay Corporation.....Uhrichsville, Ohio

WLC-159-160-A



OPEN THIS DOOR before you open the bids

You learn more about true meter costs when you open the meters for repairs than when you open the bids.

A water meter is a fine instrument, and any fine instrument loses accuracy as it wears. Because of this fact, written between the lines of any water meter price are two items of cost you can't read for many years.

First, as a meter loses accuracy, it gives away revenue. Before its first overhaul it may give away twice as much money as it "seems" to save in its low-bid original price.

Secondly, to keep the meter accurate you may have higher repair costs over the years . . . or premature scrap-and-repair programs. Good meters often vary widely in this respect.

Water is your city's most vital service. You entrust it to the accuracy of your meters. Before you buy, walk into your meter shop. Talk to the men whose efforts guard your water supply. Ask which meter gives highest sustained revenue . . . with lowest repair and depreciation costs.

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WATER & SEWAGE WORKS

Photo Courtesy Kansas City Water Dept.

Purification Control Panel, Water Treatment Plant, Kansas City, Mo., is one example of . . .

Water Supply Progress *in 1959*

By C. F. WERTZ,
Vice President, American Water Works Association

EDITOR'S NOTE: Mr. Wertz, Director, Department of Water & Sewers, Miami, Florida, reports on the success of the first 21 months operations of the Association's "DO IT NOW" Program.

Mr. Wertz then presents a more detailed discussion of important major plant developments in the fields of instrumentation, design, process, and engineering throughout the United States.

■ THE YEAR 1959 may prove to have been a significant turning point in the water industry's long uphill battle to overcome public apathy and spur vitally-needed expansion of water facilities to meet the nation's demands for potable water in the future.

At the year's end it was still too early to round up complete figures. It was indicated, however, that water supply construction probably ran ahead of 1958 totals by at least six

to eight per cent. In many quarters this was considered a healthy accomplishment in the face of the paralyzing steel strike and soaring interest rates of the tighter money markets in the final half of the year.

Realistically, it must be admitted that the water industry did not make any appreciable dent in the backlog of construction projects, estimated in 1959 to be more than two and one half billion dollars. The final 1959 construction figure will end up far below the $2,000,000,000 annual rate which many experts say is needed between now and 1975, a period in which water demands will increase from 20 bgd to at least 30 bgd. Yes, the water industry still has a big challenge ahead.

Reports from throughout the nation, however, indicated development of a growing awareness among mayors, other policy makers and in many places the general public of the need for immediate advance planning and resultant expansion of water facilities. Spotty as this reaction may turn out to be, it was emphasized by attention given to water problems by newspapers on local, regional, state and national basis. These included development of such regional water resources as the Delaware River by Pennsylvania, Delaware, New Jersey and New York.

Out in California the legislature approved enabling acts to ask the state's voters in 1960 to approve a

Photo Courtesy Lock Joint Pipe Co.

96 In. IMBEDDED CYLINDER prestressed concrete pipe being laid for Susquehanna River supply, Baltimore, Md.

$1,750,000,000 bond issue for a history-making water development program. In New Jersey, state officials started work on their first statewide scientific water development program authorized in late 1958 by a three to one vote on a $46,000,000 bond issue. There were significant local referendum victories in many states, ranging from the 3 to 1 vote in Denver for a $40,000,000 bond issue to a 90 per cent margin in the small city of Fergus Falls, Minn., to approve transfer of $475,000 in sinking funds to help finance a 20-year, $1,500,000 water system expansion program. Also heartening was the increasing number of communities where action was taken to form citizens water committees to study future water needs of their areas.

This new awareness among public officials and the rest of the public stems in part at least, this writer believes, from the stepped-up activities of the American Water Works Association during the past 21 months. It was at the Dallas conference in April, 1958, that AWWA leaders recognized the need and acted to alert mayors of communities throughout the country about the critical condition of many of their water systems.

AWWA leaders urged the local policy makers to "Do It Now" by starting construction on needed water projects that had been planned but shelved for various reasons.

But AWWA leaders did not stop with this "one-shot" program. Instead they went further to work out an overall Water Utility Advancement Program which was formally approved by the association's Board of Directors in January, 1959. This program's ultimate objective is to obtain improved water service through (1) improved public understanding of water needs through development of more effective community relations programs and (2) professional advancement of present and potential water utility managers

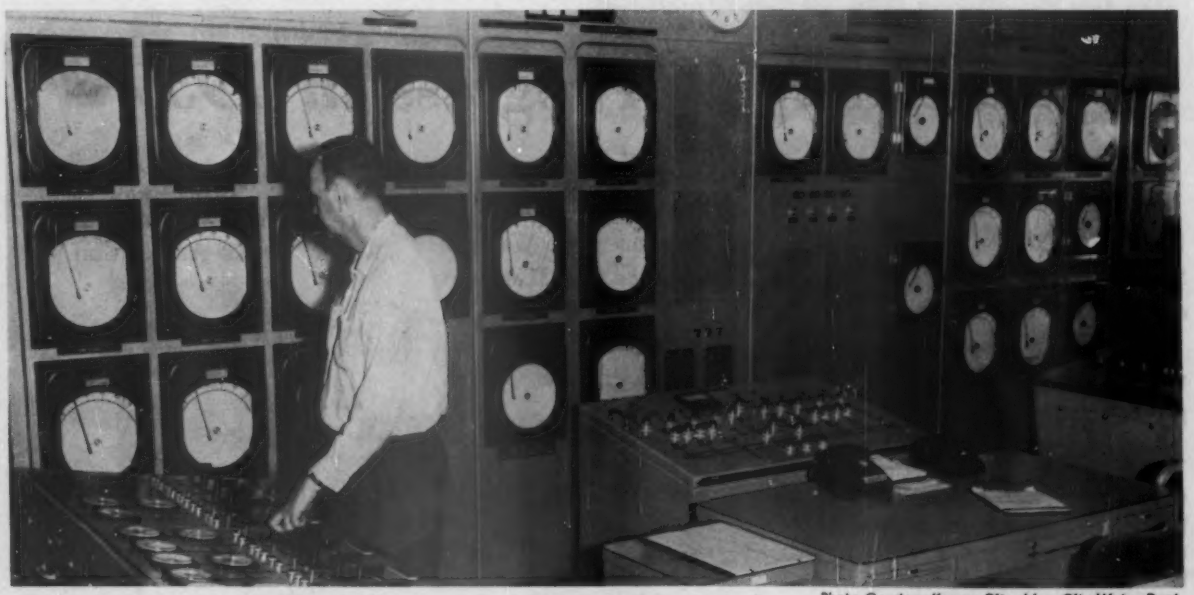


Photo Courtesy Kansas City, Mo., City Water Dept.

PUMPING CONTROL PANEL of a Secondary Pumping Station at the Kansas City, Mo. Water Treatment Plant.

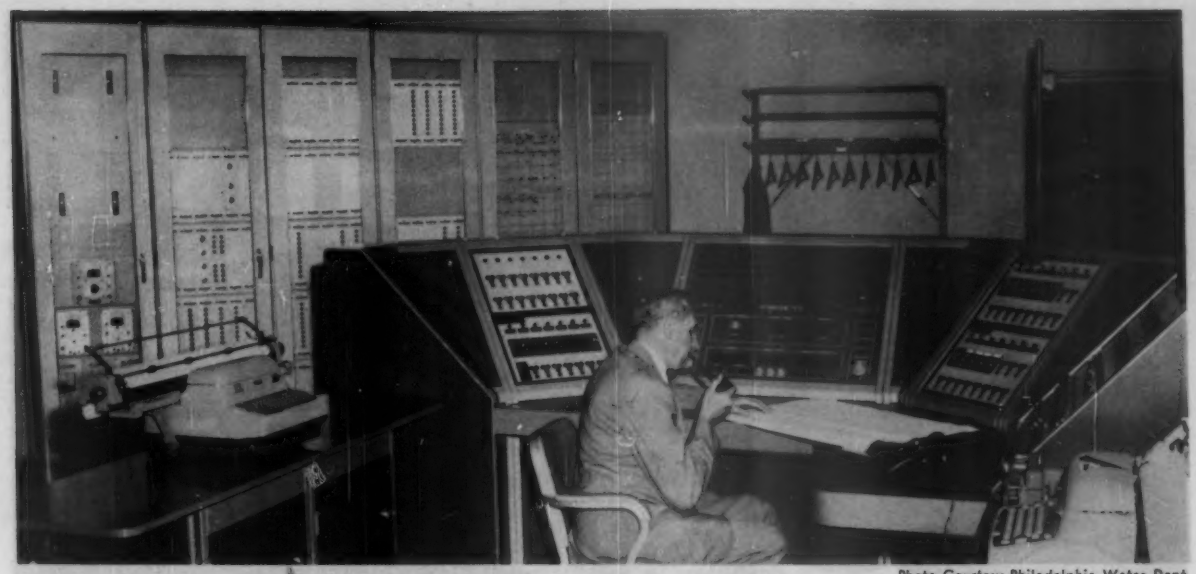


Photo Courtesy Philadelphia Water Dept.

INTELLIGENCE CENTER of the highly instrumented Philadelphia, Pa. water system.

through management education.

One of the first orders of business was to find ways and means of implementing the program by direct communications with mayors and other community policy makers to call attention to wide-spread need for having engineering studies made of their water systems to insure adequate water for the future. Other materials, directed to water utility managers, included 'how to do it' outlines on press relations, how to form citizens water committees, make local water films, set up speakers bureaus, dedicate new plants etc.—all designed to encourage public support in local action to assure their communities plenty of water when and where they need it.

Certainly it is too early to accurately judge the full effect of this expanded AWWA program seeking to speed up construction of water facilities. However, this writer's own observations in travels over a dozen states indicates considerable progress is being made in the right direction. And AWWA leaders and other factors in the industry are certain to continue these worthwhile educational efforts in 1960 and for many years to come.

A review of the construction progress in 1959 reveals that hundreds of water utilities, both large and small, contributed to the increased volume last year. However, it must be admitted that the participating group represents far too small a percentage of the total of 18,000 water systems in the United States.

Construction totals in 1959 included uncounted miles of installed pipe, including steel, cast iron, concrete and cement asbestos; new or additions to treatment plants, pumping stations and storage facilities; and outlays for finding or handling new sources of supply.

While it does not represent the biggest share of the construction dollars spent, one of the most interesting 1959 developments was a growing trend in design and construction of water utility plants to bring about greater automation. Adaptation of the industrial type of instrumentation to utilize remote control of telemetering to automatically

Photo Courtesy Fischer & Porter Co.

DATA LOGGER measures 27 critical pressures, flows, and water storage levels at Milwaukee, Wis.

Photo Courtesy Dept. Water & Sewers, Miami, Fla.

CENTRAL CONTROL enables one man to operate four large pumping stations miles away, at Miami, Florida.

control water operations is arousing widespread interest throughout the water industry. Projects in 1959 included such instrumentation in both small and large utilities.

For example, automatic controls have reduced the work load of operating the water utilities in Rochester, Minn., and St. Cloud, Minn. The Helix Irrigation District of La Mesa, Calif., operates by remote control 40 pumping stations over a 48 square mile area. In the latter case, instruments on one panel show 28 levels, pressures and flows continuously and simultaneously on a recording device, and 34 pumps can be automatically controlled.

The writer is well acquainted with the advantages of automatic controls because the Miami Central Control System, built several years ago, permits one man to do the work formerly performed by 14 men. This results in an annual saving of $30,000. This Miami system records and controls pressures, water levels, volumes of flows, etc., by leased telephone wires to the control center. Here the operator can start and stop pumps in four electric stations, as well as supervise by telephone the operation of a steam pumping station and diesel-driven pumping station with a total capacity of over 100 million gallons per day.

Photo Courtesy Johns-Manville Corp.

HIGH PRESSURE TRANSMISSION Pipe laying in Niagara County, New York.

It is understandable that some of the larger cities have moved ahead faster in the instrumentation field than have smaller communities. For example, Philadelphia is one of the leaders in the use of "automated" equipment. Philadelphia, which continued its expansion program by reconstruction of the Torresdale Filter Plant to handle Delaware River water in 1959, has built a new intelli-

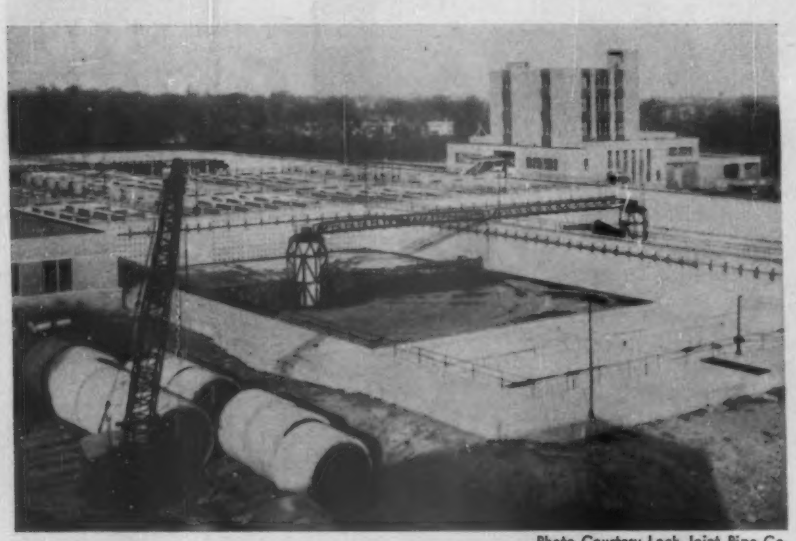


Photo Courtesy Lock Joint Pipe Co.

TORRESDALE FILTRATION PLANT under construction at Philadelphia, Pa.

gence center as the first step toward full automation of the operation of this 158-year-old water system. This new intelligence center not only centralizes records but also centralizes operational control.

It controls loading in pumping station filters, reservoirs, fire systems and distribution lines. With instruments located at 92 outlying stations or other points in the system, it will give a full picture of what is going on by recording such things as water levels in basins, reservoirs, and storage tanks; river elevations, total pumping rate of individual stations, pumping pressures, pressures in the distribution system, flow in and flow out of reservoirs, high pressure fire station pumping rates and pressures. All this information is telemetered into eight key locations including the main operating headquarters. Here the telemeter signals are converted through tone equipment to a micro-wave radio transmitter. Then the signals are sent via micro-wave to the load control center in the main operating headquarters to be processed digitally and the information printed on typewriter and tape.

Also the system has been arranged to provide visible and audible alarms automatically when low or high limits area is reached. Collection of this mass of vital information will permit installation of supervisory control initially at four small pumping stations and eventually at the other stations. To give an idea of the extensive nature of this Philadelphia installation, it might be added that the low bid for the needed equipment was $432,330.

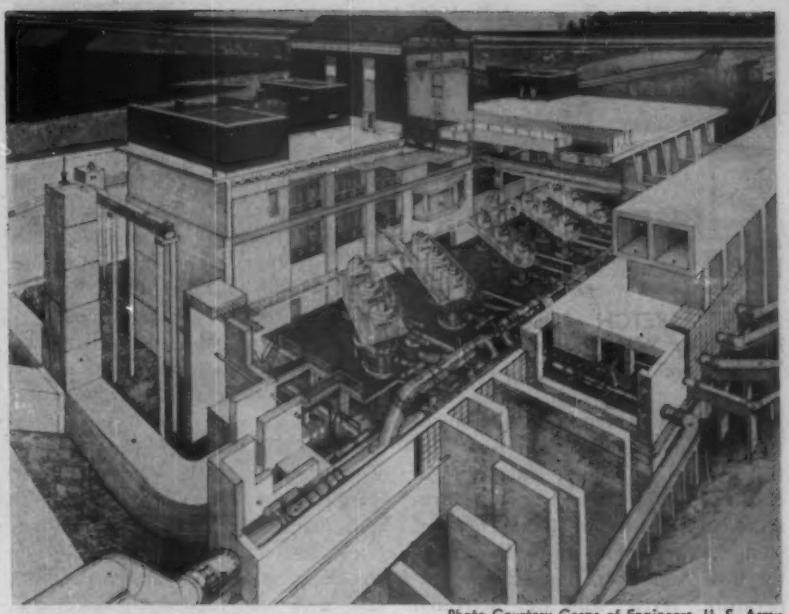


Photo Courtesy Corps of Engineers, U. S. Army

DALECARLIA PUMPING STATION, Washington, D. C., Controls the Little Falls raw water pumping station.

Another city that has centralized electronic data logging system in its water department control center is Milwaukee, where in 1959 it got a $54,000,000 expansion program under way. This new information system measures 27 critical pressures, flows and water storage levels at 12 widely separated stations. It telemeters the information to the center where it is automatically recorded on a typewriter. This electronic installation cost about $100,000.

Kansas City also is taking rapid steps toward complete automation of its water operations. A very complete instrumentation project was carried out in their program to expand their treatment plant by 50 mgd capacity. Three control panels were installed, one in the new addition, another at a secondary pumping station of the plant and a third at the Turkey Creek Pumping Station, which provides high pressure water for 60 per cent of the city south of the Missouri River.

The treatment plant panel (shown in picture) provides instrumentation for a large number of factors. These include recording total raw water flow, raw water turbidity and tem-

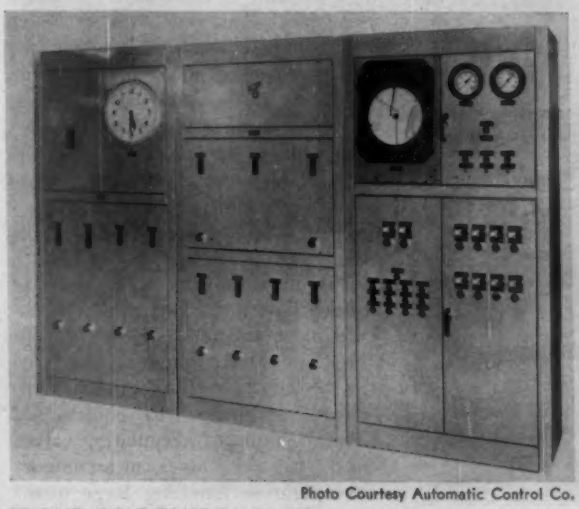


Photo Courtesy Automatic Control Co.

FRONT OF CONTROL PANEL, water supply system for Queens Hospital, Honolulu, Hawaii.

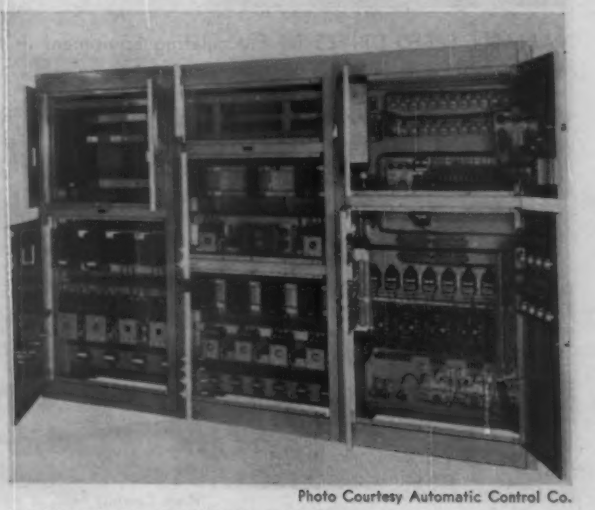


Photo Courtesy Automatic Control Co.

INTERIOR OF CONTROL PANEL, water supply system for Queens Hospital, Honolulu, Hawaii.

Photo Courtesy Whitman, Requardt and Assoc.

ARTIST'S SKETCH of the new Potomac River Water Filtration Plant, Washington, D. C.

perature, raw water flow to sedimentation basins, settled water flow, settled water turbidity, quantity of chemical sludge return at each presedimentation basin, total chemical sludge flow, chemical feeding rates for lime, soda ash, lime slaker temperature, ferric sulphate, activated carbon, chlorine and ammonia, pH of softened water, recarbonated water and stabilized water, amount of oil and/or natural gas used for primary and final recarbonization, per cent of oxygen for each carbon dioxide generator, ambient air temperature and relative humidity and turbidity of filter influent water. An operator located in front of the panel board is able to observe the flow rate and process and make required adjustments to control all operations.

The control panels located at the secondary pump station and at the Turkey Creek Pumping Station (shown in other photographs) provide for adequate remote control of widespread pumping operations. For example, the former controls operations of six different pumping systems including selection, starting, stopping and regulating speed of intake with total capacity of 400 mgd. The Turkey Creek instrumentation handles operations with 200 mgd capacity.

Photo Courtesy Philadelphia Water Dept.

RELAY RACK, the electronic "brain" behind Philadelphia's Intelligence Center.

Photo Courtesy Whitman, Requardt and Assoc.

VARIABLE SPEED DRIVES for Flocculating Equipment at Montibello Plant #1, Baltimore, Md.

Down in Washington, D. C., the Army Engineer Corps included supervisory control and telemetering for the recently completed Dalecarlia and Little Falls pumping stations. The main control center was located at the Dalecarlia station, which was constructed almost entirely underground and has a capacity of 150 mgd low pressure and 327 mgd of high pressure at three different heads. The supervisory control center, which was completed in 1959 except for control to the Little Falls Station, telemeters flows, pressures and water levels to permit control of most of the major operations of four stations. The Little Falls unit has a capacity of 450 mgd and was built to bring in raw water from the Potomac River.

Photo Courtesy Dept. of Water and Sewers, Miami, Fla.

HYDRO-TREATORS under construction at Alexander Orr, Jr. Water Plant, Miami, Florida.

Out in California a number of utilities have joined in the trend toward more and more automatic controls. The Metropolitan Water District of Southern California has installed instruments to control 22 valves, including 10 regulating valves and 12 transfer valves, in an important operation handling large quantities of water in the Los Angeles area. The Suburban Water Company

of Puente has put in a system of audio tone channels to multi-plex many controls and telemetering signals over a pair of wires common to many stations. Others to install central control systems in recent years were the San Gabriel Valley Water Company at El Monte and the City of Santa Monica.

Among other utilities moving toward more automatic operations were Morristown, N. J.; Phoenix, Ariz.; Dewey, Okla.; the Sierra Pacific Water Company in Nevada; Orlando, Fla.; Pinellas County, Fla.; Fort Worth, Texas; River Forest, Ill.; Johnstown, Penna. and Detroit, Mich.

The Morristown system consists of a number of booster pumping stations, well pumps, standpipes and other storage units scattered in and around the city. Thus the main control center is tied in through leased telephone wire connections with 26 separate units. And the instrumentation controls the operation of the entire Morristown water system except for the Harmony main booster station. It also has special equipment to alert operators to emergency situations and other out-of-the-ordinary operations.

In Phoenix, the municipally-operated utility placed into operation in 1959 its Lincoln Drive pumping station which serves as a booster station to two high level pressure zones in the northern and northeastern sections of the city. This open air pumping station, with a capacity of 20 mgd, pumps water from the 40 million gallon storage reservoirs at the 90 mgd Squaw Peak Water Treatment Plant. Two pumps serve each area with provision for crossover. Electric signals, transmitted over leased telephone wires, control stops and starts for each pump and maintains desired levels in the two tanks located several miles from the pump station. A diaphragm operated "dump" valve was installed on each line at the discharge side of the pumps to release water from the pipe lines back to the 20 mgd reservoirs in case of power failure or excessive pressure in the lines.

Photo Courtesy James B. Clow & Sons

FILTER BEDS at new Navy Pier Plant, Chicago, Ill., uses 62 miles of 14 in. cast iron pipe with perforated holes utilizing brass eyelets.

Still another interesting development in the use of automatic control equipment came during 1959 in the use of it to supply uniform pressures for water furnished tall buildings. One such installation was in Queens Hospital, Honolulu, Hawaii. This equipment controls the flow of two well pumps into a ground storage reservoir, measures the pressure of the distribution system in the building and controls the booster pumps designed to maintain the pressure within specified limits. It also measures the level in the storage tank and controls the well pumps to keep the tank level high enough so that the pumps always will have a positive suction head. Finally the equipment senses any emergency high level condition in the ground storage tank and

Photo Courtesy Hammarlund Mfg. Co., Inc.

CENTRAL CONTROL & DISPATCHING headquarters for the Suburban Water Co., Puente, Cal.

CENTRAL DISPATCHING STATION for Johnstown, Penna. Water System

Photo Courtesy B-I-F Industries, Inc.

a valve by-pass line prevents the distribution pressure from rising too high during minimum demand periods. Similar installations also have been put in buildings in the San Francisco-Oakland area including the First Western Bank Building, the 28-story Kaiser Office Building and the 25-story Veterans Field Building.

Even though instrumentation held widespread interest during 1959, the bulk of the dollar volume of construction continued to be in new and additions to purification plants, pumping stations, transmission and distribution mains.

A standout project as far as size is concerned was Chicago's continued work on construction of a new 900 mgd Central District Filtration Plant. Tremendous amounts of materials are going into this undertaking. For example, the 96 filter beds have standard 4-inch cast iron pipe underdrains, with the total amount of underdrain totaling 13,632 of the 4 by 4 by 6 inch tees and 62 miles of 4 inch pipe (see photograph). A new departure is the use and operation of Butterfly valves, with 80 of the 42-inch single flange settling basin outlet valves installed with their operating mechanism completely submerged. These valves are water cylinder operated and are designed to

CENTRAL CONTROL PANEL receives signals from 26 outlying units at Morristown, New Jersey.

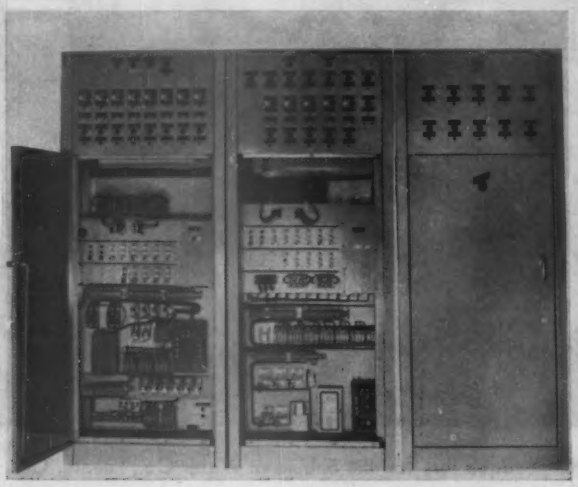


Photo Courtesy Automatic Control Co.

Photo Courtesy Henry Pratt Co., Inc.

COMPLETELY SUBMERGED Butterfly Valves installed at Central Filter Plant, Chicago, Ill.

permit flush mounting on the basin wall. A total of 96 similar 42-inch valves will be used for filter influent lines and 96 of the 48-inch 'Obround' valves will be used for wash water drain valves (see photo).

During 1959 the City of Baltimore completed revamping of their Montebello Filtration Plant. This included the installation of mechanical flocculating equipment in existing basins and the rebuilding of all filter bottoms using new tile underdrains to replace cast iron pipe and wooden slat arrangements. Also, faced with the fact that present demands are approaching available supply, Baltimore is busily engaged in tapping the Susquehanna River as a new source of supply. The pipe line to bring raw water from the new source to the expanded filter plant will involve 35 miles of 96-inch and 108-inch pipe. Rigid tests on the first section of this transmission line, which includes about 30,000 feet of 96-inch embedded cylinder prestressed concrete pipe completed in 1959, indicated leakage of only a fraction of the allowable 25-inch gallons.

Another large-scale pipe-laying installation was in the City of Milwaukee where in 1959 it installed 8,000 feet of 108-inch diameter intake pipe. The next step calls for Milwaukee to lay 18,000 feet of 84-inch diameter pipe to carry lake water to its treatment plant. The City of Greenville, S. C., also has under construction about 8,000 feet of 48-inch transmission mains.

The Niagara County, N. Y. Water District, organized in 1958, got started in 1959 on construction of a county-wide water system. It involved laying of twin 60-inch intake lines to draw water from the west branch of the Niagara River and a 42 inch line across Grand Island and on to the east branch of the river and to a 12 mgd treatment plant and high service pumping station. Over 65 miles of transmission lines make up the arterial system of the project. This Niagara County program is a badly needed improvement because previously residents of the entire county, except for those living in Niagara Falls and Lockport, had to depend mostly on inadequate private wells. It is predicted that completion of the $9,000,000 project, in 1961, will spark a $50,000,000 to $100,000,000 industrial development.

Meanwhile in the City of Miami, work went forward on schedule on the increasing of capacity of the Alexander Orr, Jr., water treatment plant from 40 to 100 mgd. This expansion included addition of twelve 5 mgd filters, two additional hydrotreaters, each rated at 15 mgd, and four additional wells of 7 mgd each.

Photo Courtesy Phoenix Water Dept.

OUTDOOR PUMPING STATION with a pumping rate of 20 mgd, Phoenix, Ariz.

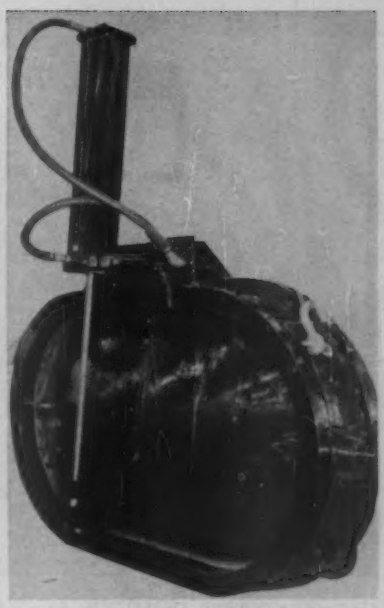


Photo Courtesy Henry Pratt Co., Inc.

NEW "ORBOUND" Butterfly Valve for wash water drain lines, Central Filter Plant, Chicago, Ill.

Photo Courtesy B-I-F Industries, Inc.

REMOTE TELEMETERING & CONTROL located at the South Holly Plant, Ft. Worth, Texas.

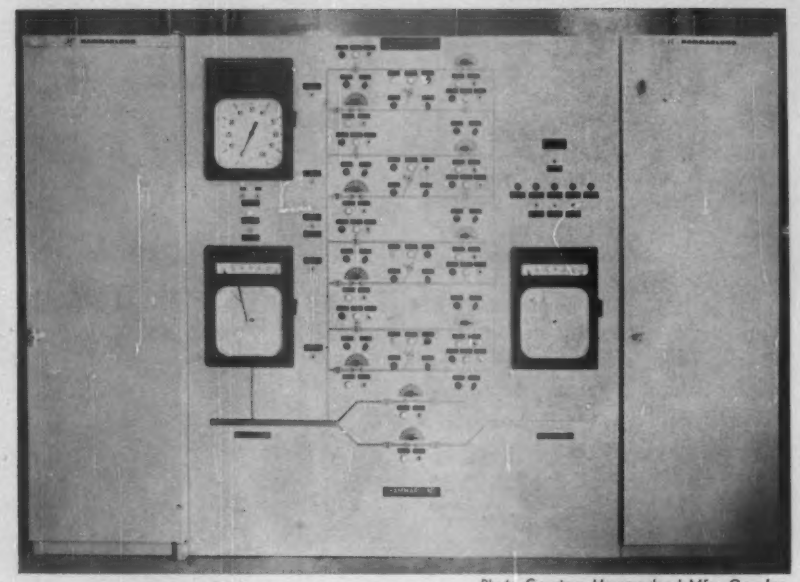


Photo Courtesy Hammarlund Mfg. Co., Inc.

CENTRAL VALVE CONTROL Panel, Metropolitan Water District of Southern California.

The job includes several thousand feet of 54-inch and 60-inch prestressed concrete pipe as a beginning on a second four mile long raw water pipe line from well field to softening plant. Another interesting development was the city's purchase of a site for a third softening plant, at a cost of $256,000. This action was taken on the basis of a series of studies by the Department of Water and Sewers that convinced the City that it was a smart move to purchase the land now in view of rising prices despite the fact the first section of the new plant would not be needed until 1964 or 1965.

Another major project is underway at Des Moines, Ia., where an addition to the treatment plant will increase its capacity from 50 mgd to 100 mgd. Also the Washington, D. C., Suburban Sanitary District has completed a new pumping station and treatment plant on the Potomac River upstream from Washington to supply water to Prince Georges and Montgomery Counties in Maryland. The Metropolitan District of Southern California also finished work on five pumping stations along the Colorado River Aqueduct by installing the last of six pumps in each station. The City of Cincinnati is building a new raw water pumping station while other improvements were started or completed in Topeka, Kas., Gadsden, Ala., Springfield, O., Wilmington, Del., Peoria, Ill., New Oxford, Pa., Midland, Mich., and Bismarck and Mandan, N. Dak.

Acknowledgment

The writer wishes to express his appreciation for the mass of material sent him by friends in the water utility industry and by manufacturers, which made this progress report possible. It is unfortunate that only a fraction of the material received could be used but time and space would not permit.

Photo Courtesy Kansas City Water Dept.

PUMPING CONTROL PANEL located at the Turkey Creek Pump Station, Kansas City, Missouri.

In view of the recent name change of the Federation, this year's sewage review is titled . . .

Progress In Wastewater Treatment And Pollution Control *In 1959*

By MARK D. HOLLIS, President, Water Pollution Control Federation (formerly F.S.I.W.A.)

EDITOR'S NOTE: Dr. Hollis, in his position as Assistant Surgeon, Chief Engineer of the U. S. Public Health Service, is in a truly excellent position to review the progress made during 1959. As Dr. Hollis reports, cities are now spending at the $400 million per year level, but real progress will be measured when a much closer understanding of the pollution problem and its potential in terms of water conservation and reuse, is realized.

■ WHEN THE TOTALS are tabulated, 1959 should be a banner year when measured in terms of brick and mortar and concrete and steel representing construction of municipal and industrial waste treatment works. Cities are now spending at the $400 million per year level for new or improved waste treatment plants. While this is still considerably below the "break even" level, considering growth of sewered population, the war backlog and obsolescence, it is up 100% over the 1950-55 annual average. This is impressive and State and local authorities are to be commended. If the data were available on industrial waste treatment, I suspect we could report comparable gains in corrective and remedial actions for those industries not discharging to municipal systems.

But the significant "progress", in my view, is not to be found in the statistics of construction nor in the advancements of waste treatment technology. Rather, in a real sense, it is the news behind the news. For some years we have witnessed a growing debate within our professional circles as to status and progress in water pollution. This debate has shaded all the way from obvious over-optimism on pollution control to equally obvious gross-pessimism. The tragedy, however, is not in the wide deviations of professional view, but rather the lack of agreement or even understanding as to common denominators. We try to equate the complex formula of water pollution with extremely spotty data and in some cases without proper parameters to measure just what the composite pollution amounts to. We tend to talk about pine-cones and crab-apples in terms of pineapples—and obviously we disagree.

Over the past year there has been growing evidence of a much closer understanding of the pollution problem today and its potential for tomorrow in terms of water conservation and use. To support our modern technology, water needs are moving to astronomical figures. In turn, the growing population with growing

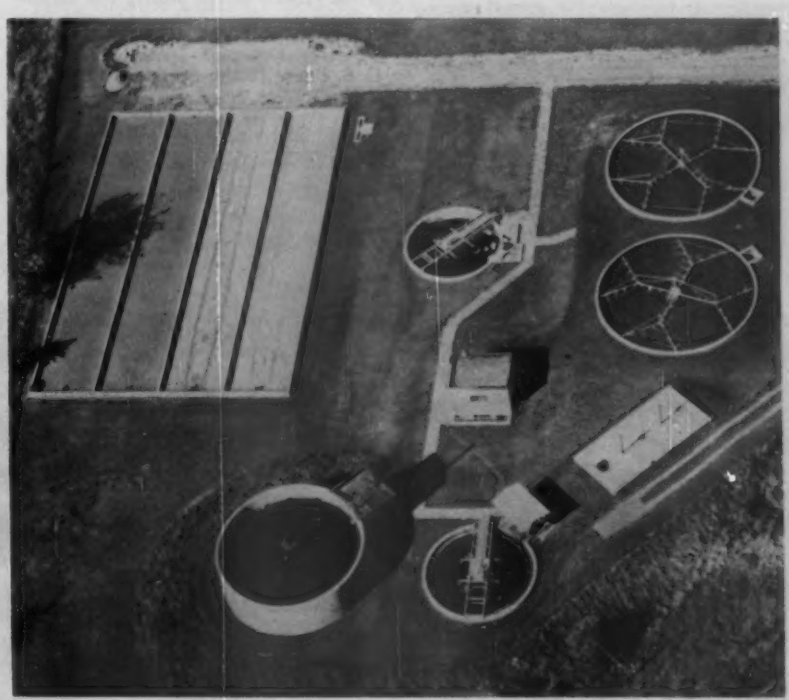


Photo Courtesy Lakeside Engr. Corp.

AERIAL VIEW of new sewage treatment plant at New Carlysle, Ohio, utilizing 2 - 30 ft. dia. Spiraflo units and 2 - 48 ft. dia. Aero-filters.

levels of national demand are producing wastes of greater volumes and wider complexities. While there are still wide areas of disagreement as to the composite effects of this total pollution on water use, the more important and optimistic factor is that the professionals are approaching an understanding on common denominators. In terms of progress this is the news of 1959 and bids well for 1960.

General Observations

As we approach limits of available water a variety of attempts are made to provide more usable water. The recharging of ground water, the use of monomolecular layers of substances as evaporation deterrents, programs of saline water conversion, even cloud-seeding—these all represent efforts to get more water to shortage areas.

However, an increasing number of qualified experts are convinced that the one sure, reasonable, logical way of creating more water is to save more water. This means that the same water can—and must—be used over and over again.

If water re-use is the most feasible means of assuring adequate quantity, then pollution abatement constitutes the only way of assuring adequate quality. It is generally agreed among water supply experts that the Nation's water needs can best be met by controlling pollution to permit the repeated use of the same water as it moves from source to sea. More "new" water can thus be added to the Nation's water reserve by controlling pollution than by any other means.

TABLE 1

Needs for Facilities by Present Treatment Plants*

Need	No. of Plants	Estimated population served—1,000's
Replacement	1,123	3,448
Enlargement	779	17,001
Additions	851	8,370
Chlorination	44	696
Improved Operation	366	992
Connection to adequate system	24	66
None	4,331	45,871

The answer to the question—how well have we controlled water pollution in the past year?—can be given in terms of the five-part problem posed by pollution. First, with regard to municipal wastes, it can be agreed that the basic knowledge and the application of this knowledge necessary properly to treat traditional sewage and waste are available. In other words, for normal waste we know what to do and how to do it. A major evidence of the activity in the treatment of municipal wastes is the record of the slowly but steadily mounting national program of community waste treatment plant construction, which recently has been sparked by the provisions of Public Law 660, the Federal Water Pollution Control Act.

In terms of industrial wastes, efforts are also under way to treat wastes more effectively and completely. A third element in the water pollution problem is the need to strengthen the national monitoring network in order to find out more precisely and get better "intelligence" on what actually happens in our streams. Still another element is the recognition of recently risen new problems, such as the chemical organic synthetics and radioactive wastes. Finally, account must be taken of the role and contributions of research in water pollution. In terms of these five elements, a brief assessment of recent progress in water pollution can be attempted, even though the year is not up yet and the data are incomplete.

Community Waste Treatment

Any estimate of growth in the expansion of municipal treatment plant facilities and service can best be evaluated in terms of need. Table 1 indicates the backlog of the need as of a few years ago for more facilities by communities who have waste treatment plants. Table 2 indicates the need on the part of raw discharge systems.

*From Thorman, J. R., and Jenkins, K. H., *Municipal Sewage Treatment Needs.* U. S. Public Health Service Pub. No. 619, 1958, P. 13.

Photo Courtesy Walker Process Equipment, Inc.

NEW SEWAGE TREATMENT plant being built at Mansfield, Ohio.

These data indicate that almost 4,000 new plants to serve more than 22 million people were needed in 1957-58 to replace existing plants and in systems discharging raw sewage. Improvements are needed at existing plants serving an additional 26 million persons.

The last few years have seen some impressive activity in cutting into the tremendous backlog of new and replacement facilities required in this country, even though the levels currently attained fall noticeably short of doing the entire job.

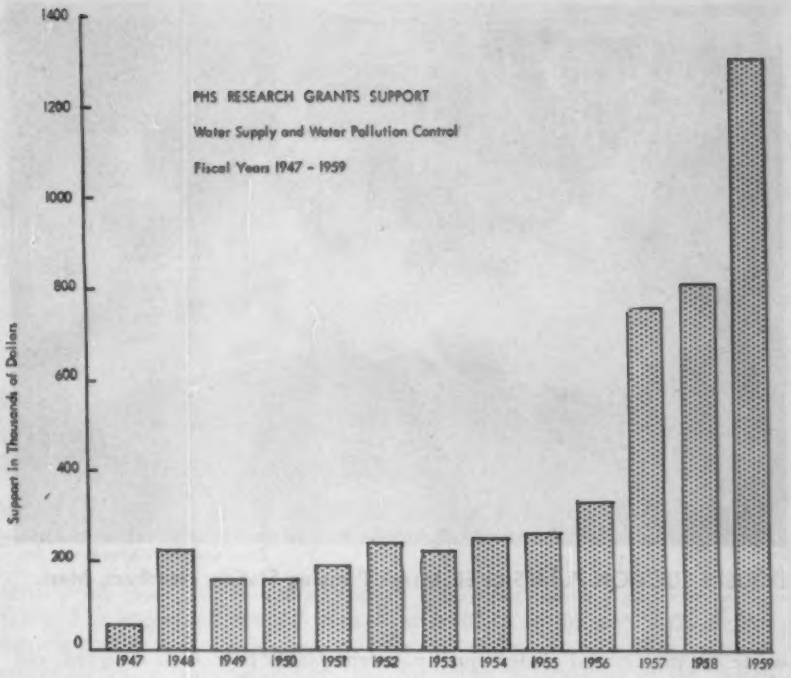
For example, a major stimulus to more comprehensive and adequate municipal water treatment has come from the Federal Construction Grants provisions of Public Law 660. Data for the recent past indicate the vigor of growth during 1959. The total 1958 sum of $389 million in water treatment plant construction was approximately 75 percent higher than the 1952-56 five-year annual construction level. The 1959 total is expected to exceed the $400 million mark. Since "the proof of the pudding is in the eating", it is gratifying to report that currently there are $5 worth of waste treatment plant construction for every Federal grant dollar. Are the neediest areas the most active? The answer is clear: 99 percent of all sewered communities have a population of less than 100,000. Practically all the construction grant projects have been assigned to communities in this size category. In more dramatic detail, contract awards in 1957 for sewer treatment works serving these towns were 82 percent above the previous 5-year annual average of construction. In 1958, this total soared to 130 percent over the 1950-55 annual average.

TABLE 2

Needs for Facilities by Present Raw Discharge System*

Need	No. of systems	Estimated population served—1,000's
New plants	2,851	18,725
Connection to adequate system	40	861
None	157	2,332

*From Thoman, J. R., and Jenkins, K. H., *Municipal Sewage Treatment Needs.* U. S. Public Health Service Pub. No. 619, 1958, P. 13.



Still another major impetus to facilities and treatment expansion is provided by the $3 million grant to States for assistance in developing their own water pollution control programs. This is another feature of Public Law 660. In the first two years of this activity, 1956-58, the States increased their control programs by some 40 percent. More specifically, in 1956, the 12 States ranking lowest in money spent for water pollution abatement spent a total of approximately $75,000, representing an average of $6,250 per State. In 1958, these same States spent a total of $382,000, representing an average of $32,000 per State, thus showing a five-fold expansion. Though data for calendar 1959 are not yet in, there is every indication that this accelerated rate continues.

Industrial Wastes

Activity and progress in the water pollution abatement of industrial wastes is, unfortunately, not too well catalogued. A subcommittee of the National Technical Task Committee on Industrial Waste together with representation from the National Association of Manufacturers has been busy this year preparing a report of a plan for the gathering of data by industry on the water used and the management of waste disposal. The NTTCIW reported the publication of information on a punched card system developed for recording and making readily available to the user, information in the literature on the industrial

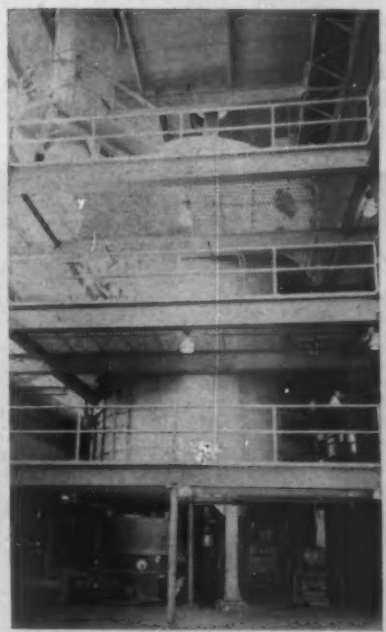


Photo Courtesy Nichols Engineering & Research Corp.

SEVEN HEARTH SLUDGE furnace at Nashville, Tenn., which handles 9,000 lbs. of filter cake, grit, and grease, per hour.

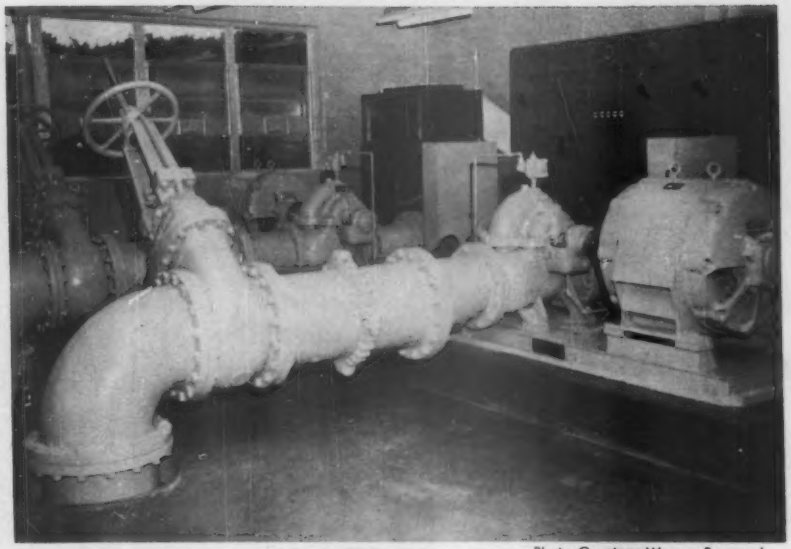


Photo Courtesy Warren Pumps, Inc.

DOUBLE SUCTION PUMPS at St. Mary's Pumping Station, Needham, Mass.

waste treatment and water quality improvement. A revised edition of the Industrial Waste Guide on the Milk Processing Industry was published; two other Industrial Waste Guides were completed and submitted for publication; these were on the cotton and cane sugar industries.

There is ample evidence throughout the country that industry is acutely aware of the pollution problem and that individual industries are giving top-level attention to these problems. The automobile, chemical, and paper and pulp industries have been particularly active. New treatment plants have been designed, old ones expanded and remodeled, treatment plant operator training programs have been instituted, and comprehensive manuals have been developed.

Many industrial plants improved their individual wastewater problems either by in-plant changes or by waste treatment works. An outstanding example of the latter was at the Luke, Maryland, plant of the West Virginia Pulp and Paper Company, where the company constructed a waste treatment plant to handle both industrial wastes and the municipal wastes from three communities. This was another exemplification of good cooperation between industry and its municipal neighbors.

The pulp, paper and paperboard industries through the National Council on Stream Improvement, and the iron and steel industry through the American Iron and Steel Institute continued their research projects and wastewater abatement activities. The Purdue Industrial Waste Conference, The Southern Municipal and Industrial Waste Conference, the Ontario Industrial Waste Conference and the annual meeting of the Federation of Sewage & Industrial Wastes Assns., all had strong technical programs covering specific wastes of many types, research, industry-municipality cooperation, and public relations.

Stream Monitoring

Many pollution problems are of such magnitude and type that a specialized approach is needed to equate their impacts and devise remedial measures. For example, in 1957, the U. S. Public Health Service initiated an investigation of a pollution problem in the Ark-Red basins in cooperation with other Federal and State agencies. The objectives of the study were to find the sources of the pollutants; determine the types and volume, and devise a practical means of controlling them. The survey is scheduled for completion by June 30, 1962. The

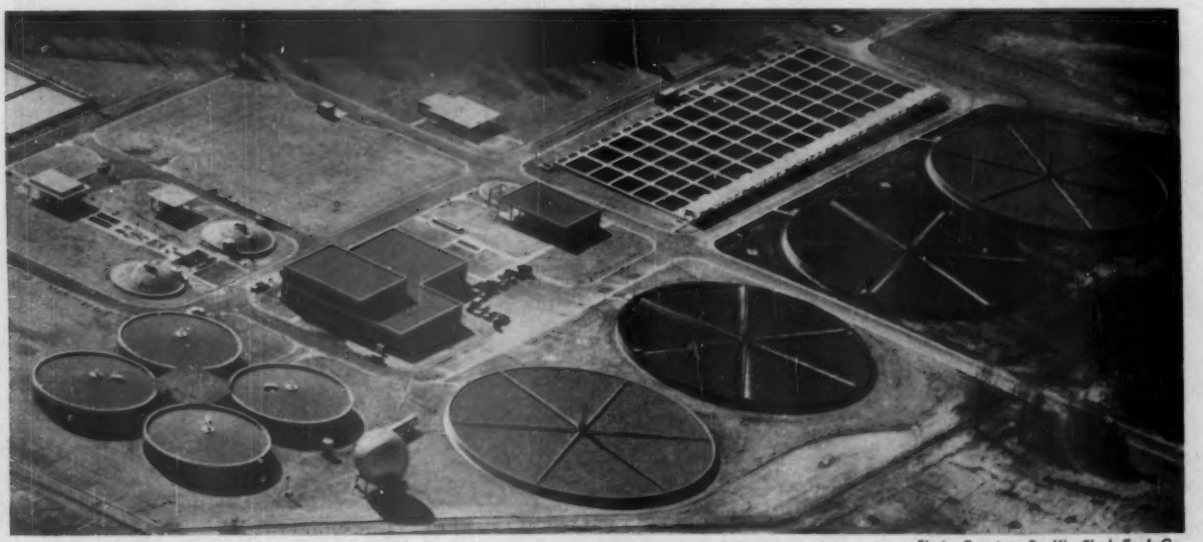


Photo Courtesy Pacific Flush Tank Co.

AERIAL VIEW of new sewage treatment plant at Winston-Salem, N. C. This plant has a design capacity of 25.0 mgd.

control measures that are recommended are to be carried out by other Federal, State, and local agencies, or private industry.

No individual organization or single industry is in position to gauge the full effect of its wastes on the amount and kind of other pollution in streams short of complete stream analysis. This is, of course, a herculean task. The complexities encountered by both industry and municipalities in treating waste focus increasing attention on the need for more precise information regarding the quality of the Nation's water resources, how they are being contaminated, and by how much of what.

A first blueprint of these conditions is emerging through the National Water Quality Network which was instituted a few years ago by the U. S. Public Health Service. Organized, maintained, operated, and financed jointly by the Federal Government State and local agencies, approximately 60 sampling stations of an anticipated total of 250 have been established at a number of water courses for the examination of radioactivity, plankton and coliform organisms, organic chemicals, and for carrying on a number of biochemical, chemical, and physical measurements. Local laboratories are performing conventional chemical analyses. The more complex examinations are made by the Public Health Service. The Service is also making all results available to collaborating agencies and other interested groups.

The publication of the first year's data gathering operation has recently become available. A companion volume of analysis and summarization is in press and will be out early in 1960 together with the compilation of the second year's data. The plan is to issue annual documents within three months following the "water year", namely, every January-March.

A note of optimistic caution must be sounded, however. Much vital, descriptive data—"intelligence", if you please—remain to be gathered. Once gathered, analyzed, and interpreted on a comprehensive and continuing basis, standard parameters must be established and these must be widely disseminated, accepted, and used.

Federation Activities

In the midst of all these developments, the Federation itself has been active this year in a number of areas. The water and sewage works manufacturers and other groups recently formed a National Water Institute. It is the stated aim of the NWI to improve the public's understanding and awareness of the need for more facilities and the proper operation of water and waste treatment works.

Photo Courtesy Dorr-Oliver, Inc.

INCREASED DIGESTER CAPACITY at Jamaica, New York. This plant is expected to reach design capacity of 65.0 mgd. by 1961.

The Federation's Board of Control reached a decision at Dallas to change the name of the organization to "Water Pollution Control Federation". Among the reasons for the change was for a broader perspective and a better public understanding of the organization and its aims and operations.

One other phase of improved public relations on the part of the Federation was a public release program for those participating in the Dallas meeting. About 120 releases were prepared and sent to newspapers throughout the country. There was also local Dallas newspaper, radio, and television coverage of the meeting.

The Federation membership now exceeds 8700 with paid subscriptions to the Federation Journal more than 10,000. One of the principal publications of the Federation in 1959 included the 10-year Index to *Sewage & Industrial Wastes*, available either in cloth or paper bound editions. Other publications included the re-

Photo Courtesy Pacific Flush Tank Co.

PEARTH GAS RECIRCULATION equipment installed on 95 ft. dia. floating cover digester at Oakland, California's Sewage Treatment Plant.

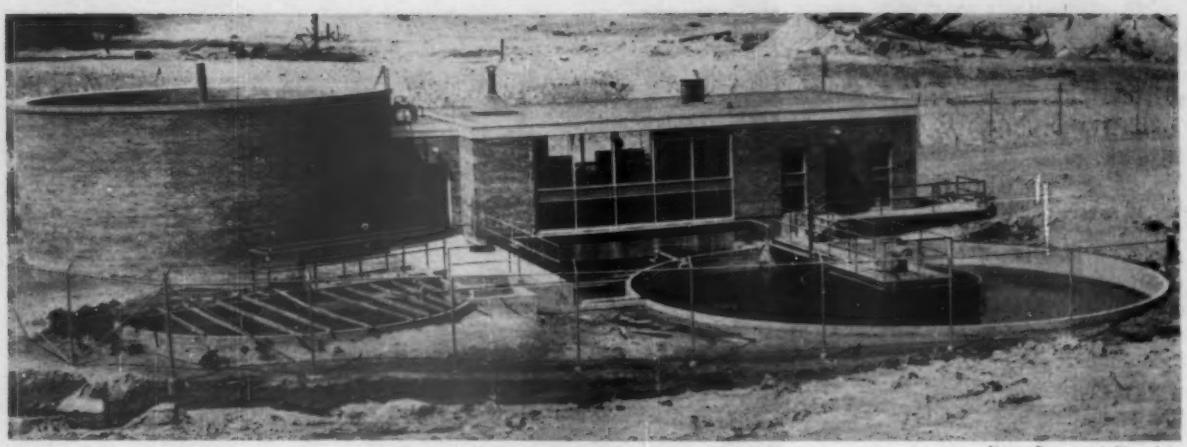


Photo Courtesy Infilco, Inc.

AERO-ACCELERATOR® plant at Elliot Lake, Ontario, Can., the town uranium built.

vision of the Federation Manual of Practice No. 1 under the title "Safety in Wastewater Works" and the manuals published jointly with ASCE, to wit: Manual No. 8, "Sewage Treatment Plant Design" and Manual No. 9, "Design and Construction of Sanitary and Storm Sewers".

The annual meeting of the Federation at Dallas, Texas, drew 1272 registrants. While the registration was not as large as the previous year, in other ways, this meeting exceeded previous conventions, with 11 technical sessions, 50 technical papers and two inspection trips. The fifty-five exhibitors represented an increase of ten over 1958. One new feature at the Dallas meeting was the luncheon of the Water & Sewage Works Manufacturers Assn., held on Monday of the meeting.

On a related front, the Federation, together with the American Water Works Association and the Conference of State Sanitary Engineers, have concerned themselves with the certification of operators of water and sewage works, both municipal and industrial. Waste treatment is Big Business. A good part of this is public works. These represent major capital investments. In order to get the most value and return from such investments, they must be operated efficiently. The Federation, AWWA, and CSSE are therefore pressing strongly for improved operations by means of certification and standards of operations efficiency. Real progress is being made in the form of "operator schools" and other mechanisms whereby operators and administrators of water treatment and sewage plants can update themselves by exposure to the latest developments in this field.

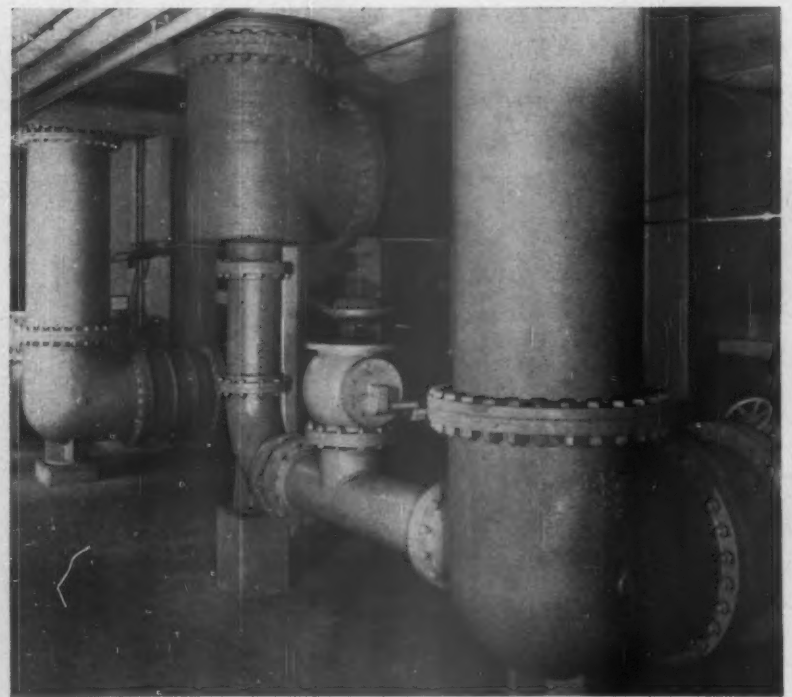


Photo Courtesy Cast Iron Pipe Research Assn.

KRAUS INTERCHANGE PROCESS employed at the new sewage plant serving South Bend, Ind.

Future Water Needs

A look at tomorrow's needs can help establish the extent and/or effectiveness of today's progress. Table 3 shows the estimated population served by three categories of surface raw water supplies.

Interest and concern are greatest in categories B and C. Waters which are adequate in quantity but low in quality now serve 42 million people or 42 percent of the total population currently using surface supplies. But the quality factor in the breakdown definition ranges from "poor" to "very poor". In the years to come these waters will move toward the "very poor" level, and it is in these category B situations that the shortcomings and limitations of waste treatment methods will first become more noticeable.

The current parameters of pollution—BOD, the bacterial indicator organisms, and the determination of natural organic and inorganic substances, even tastes and odor determinations—all were developed in the early stages of modern sanitary engineering. Prior to World War II these were reasonably satisfactory yardsticks for the pollution situation of the times. They are still important to the concept of assimilation of pollution by dilution and to measure the self-purification phenomena of streams. But they do fall short—far short—of being effective measurements as reuse of water supplies becomes a dominant factor and as the character of pollution changes.

Consider that today such rivers as the Ohio, Delaware and others are used and reused several times at the dependable low flows. In the years ahead six-time water reuse may become a common situation in many streams.

Under these conditions, the concept of assimilation of pollution by streams simply breaks down as a major usable factor in the treatment of wastes. Past practice has accepted 90 percent removal of BOD as being "complete" treatment of municipal waste and sufficient for discharge of the effluent to any stream. Yet, troublesome conditions still exist below such cities as Chicago, Indianapolis, Columbus and Dayton.

The BOD determination alone reflects only part of the picture on accumulative effects of continuing reuse. Each municipal use brings about a substantial build up in naturally occurring minerals and a much larger increase in the new exotic substances. These increases alter the environment of the stream, and undoubtedly have profound and as yet ill-defined effects on beneficial stream uses.

Thus, the term "complete treatment" as now defined, and the percentage of removal of BOD, the suspended solids, and the bacteria, are inadequate parameters for assessing stream quality in this technological age.

With respect to Class "C" waters, the figures are relatively low, but obviously highly significant to those millions of Americans affected. Improvements in this Class will depend upon major breakthroughs in our water or waste treatment technology or major interbasin distribution of water supplies.

Photo Courtesy Smith & Loveless, Inc.

PACKAGE SEWAGE PLANT serves the Lakeview Gardens Subdivision of Kansas City, Mo.

Photo Courtesy Process Engineers, Inc.

SECONDARY TREATMENT FACILITIES at Wichita, Kansas, raise total plant capacity to 75 mgd.

TABLE 3

Population Served By Various Classes of Surface Raw Water Supplies

(Population in Millions)

Water Source Classification	Year 1960 Pop.	%	Year 1980 Pop.	%	Year 2000 Pop.	%
A. Adequate in quantity and quality	53	53	82	50	121	47
B. Adequate in quantity but low in quality	42	42	71	43	113	44
C. Inadequate in quantity and quality	5	5	12	7	25	9
TOTALS	100	100	165	100	259	100

Waste Treatment Research

It is in the field of water pollution abatement research that the lag is greatest among all the elements that go to make up the problem of containing and reducing the contamination of the Nation's water resource. Both health and economics are at stake. The tremendous increase in the kinds and amounts of old and new wastes spewed into the waters stagger the imagination. Among newer waste products are synthetic organ-

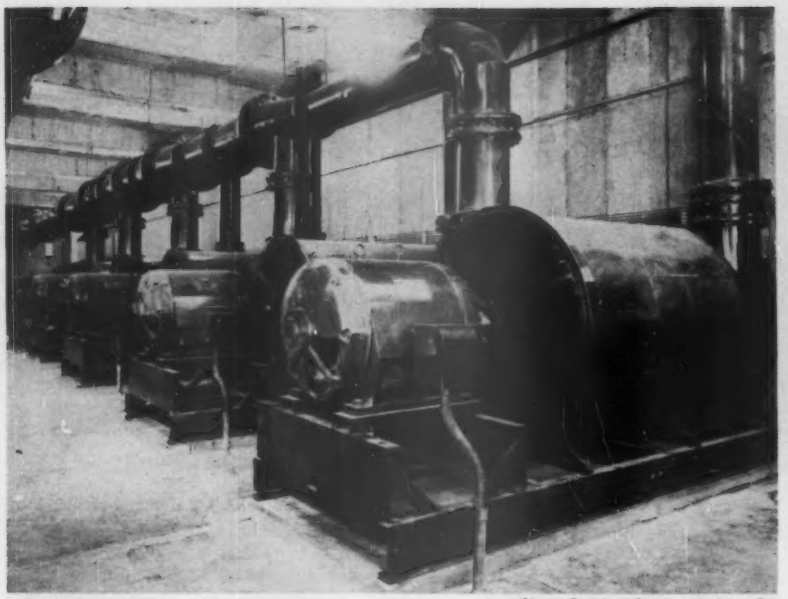


Photo Courtesy Spencer Turbine Co.

LARGE BLOWERS provide 6,000 s c f m at 7 lb. pressure to aeration tanks at sewage plant, Warren, Michigan.

Photo Courtesy Texas Vitrified Pipe Co.

"TRANSLOT" VITRIFIED Clay trickling filter floor and channel being installed at West Dallas, Texas.

ics, detergents, and related exotic substances—wastes often so complex as to almost defy identification, separation, and analysis by current techniques in terms of their pollutional characteristics or their actual and potential toxicity not only to animals and aquatic life but also to humans.

Throughout the country, universities continued research on a wide variety of subjects concerned with the character and treatment of domestic sewage and industrial wastes. Many of these projects were supported by the Public Health Service grants for research. The growth of such supported research is indicated by the accompanying chart. Research grants in 1959 totalled nearly $1.3 million and covered 110 research projects.

However, research is often sporadic and uncoordinated. It is essential that at all levels and in all centers—Government, university laboratories, private research organizations, and industry—more creative attention, more refined skills, and much more money must be invested in the search for more and different methods, and more economical methods of treating polluted water. The great need is for more data and techniques with which we can guide our concepts and future trends so that we can contain pollution within livable limits.

In restrospect, the year 1959 witnessed substantial accomplishments, coupled with an increased understanding and appreciation of the fact that we cannot rest on our laurels. Neither can we be content to merely move forward at a rate of 5 to 10 percent over the previous year. We need a breakthrough and a new approach to wastewater treatment; we need new methods of upgrading the efficiency of wastewater treatment processes; we need new parameters of accomplishment; and we need increased effort to meet the challenge of a booming population growth and industrial expansion and the problems resulting therefrom. Based on accomplishments in 1959 we look forward to a productive seventh decade in this century.

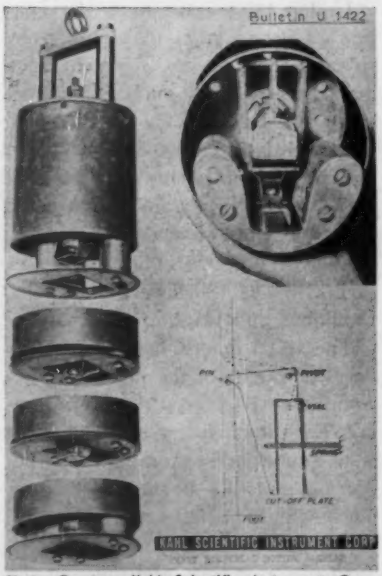


Photo Courtesy Kahl Scientific Instrument Corp.

BACTERIAL BOTTOM SAMPLER obtains undistributed sediment samples for bacteriological investigations.

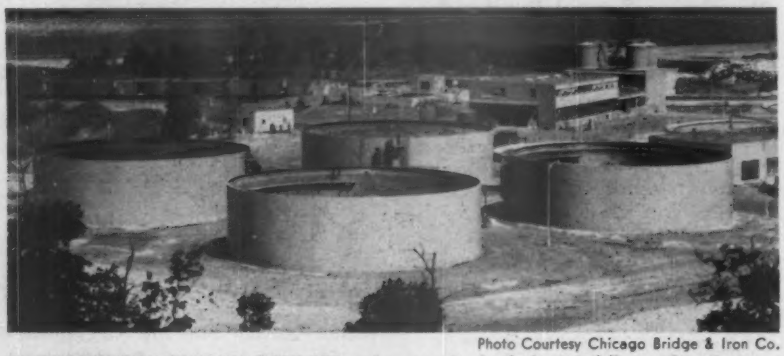


Photo Courtesy Chicago Bridge & Iron Co.

FLAT BOTTOM TANKS of 800,000 gal. capacity built for Middlesex Co. Sewage Authority, New Brunswick, N. J.

Automation, and Products Designed Specifically For Use With Automatic Controls

Are Evidenced In This 1959 Review Of . . .

New Equipment, Plants, and Installations

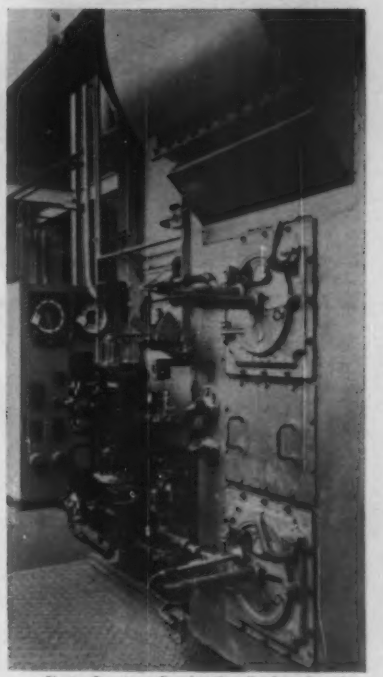


Photo Courtesy Combustion Engineering, Inc.

FIRING AISLE OF RAYMOND sludge drying or incinerating furnaces.

■ THE YEAR 1959 provided additional impetus down the road toward the day of the almost completely automatic plant. One of the big events, in the Water Field was the opening of the new $25 million Torresdale plant in Philadelphia, Pa. Over $0.5 million were spent for automatic and semi-automatic controls and instrumentation, making this one of the most completely automated water treatment plants in the United States today.

Similarly, great strides were taken in the sewage treatment field in both dollar expenditures and processes developed.

We present here a quick photographic skimming of the surface of some of the developments during 1959 in equipment, plants, and installations.

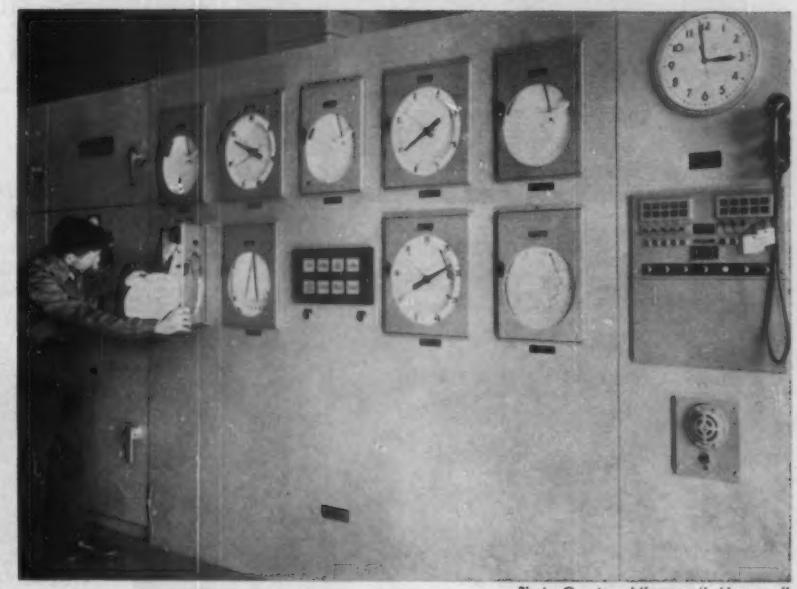


Photo Courtesy Minneapolis-Honeywell

MASTER CONTROL in filter building of Springfield, Ohio's $8.5 million water treatment plant.

Photo Courtesy Link-Belt Co.

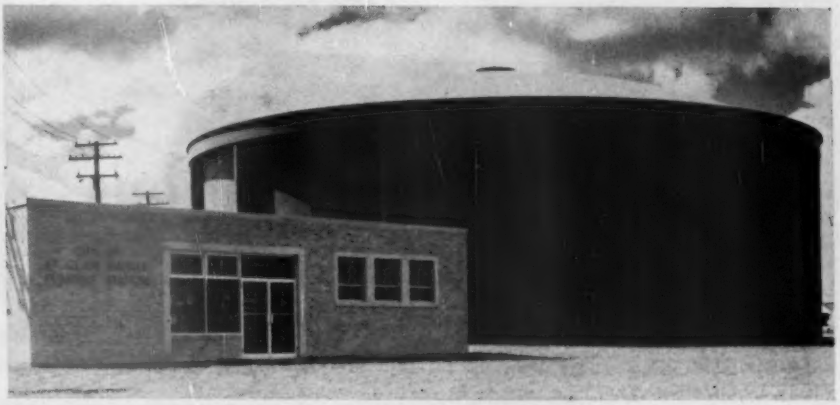
▲ ROTOLINE SCUMPIPE at effluent end of settling tanks, new sewage plant at Marina, Fla.

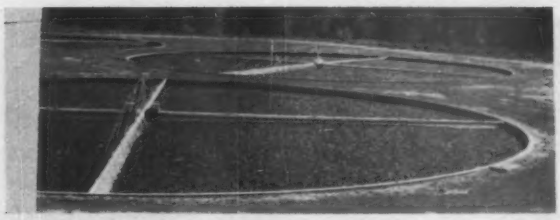
Photo Courtesy Multiplex Mfg. Co.

▲ AIRVALVE for Deep Wells.

STEEL RESERVOIR, 4-MILLION GAL., 132 Ft. dia. 40 Ft. high, for St. Claire Shores, Michigan. ►

Photo Courtesy Chicago Bridge & Iron Co.





◄ TRICKLING FILTERS FOR PUEBLO, COLO. new sewage disposal plant.

Photo Courtesy American Well Works

▼ ALL-PLASTIC VACUUM leaf type diatomite filter.

Photo Courtesy B-I-F Industries

Photo Courtesy Roots-Connersville Blower Co.

▲ BLOWER features vertical arrangement of impellers, which provides horizontal inlet and discharge connections.

◄ SEVEN-INCH COMMINUTOR for package treatment plants.

Photo Courtesy Worthington Corp.

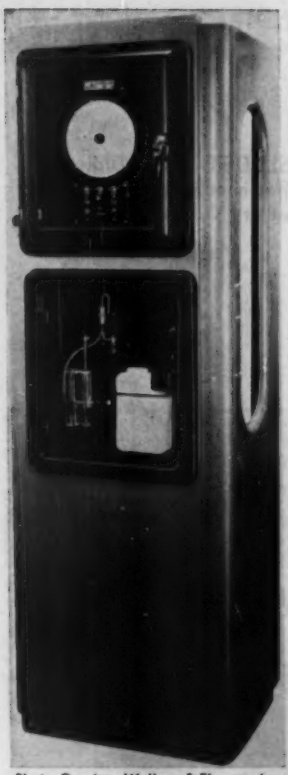
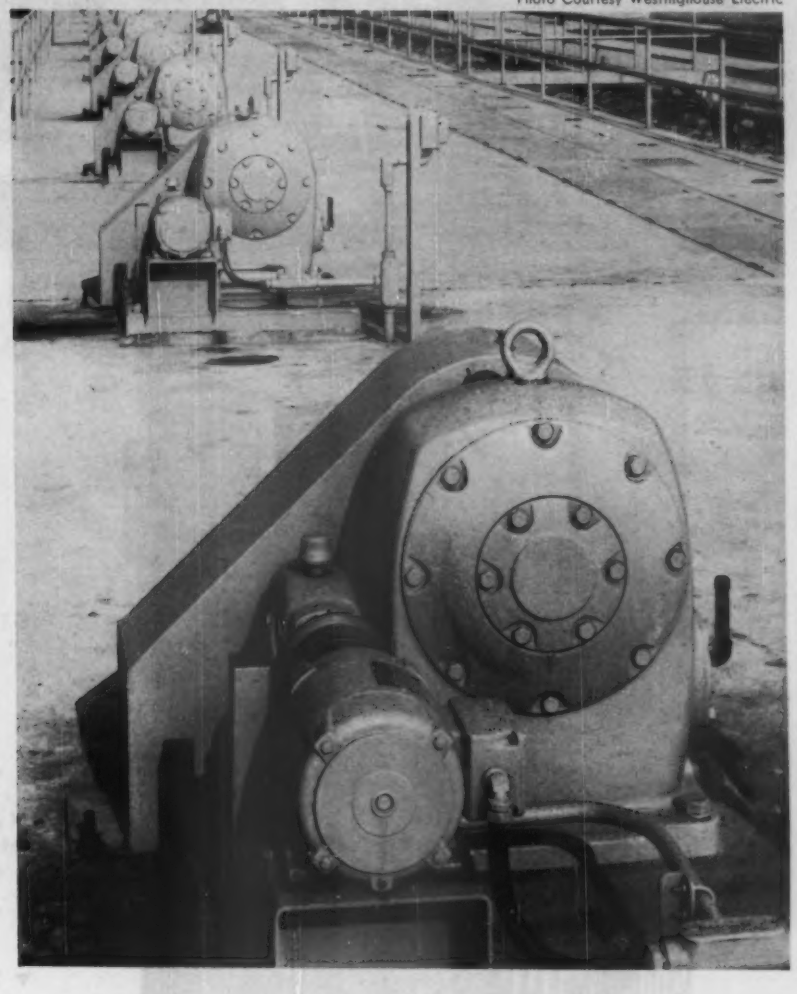


Photo Courtesy Wallace & Tiernan, Inc.

▲ RESIDUAL CHLORINE RECORDER for recording and controlling residuals automatically.

▼ PITTSBURGH CONCENTRATES, undigested sludge for incineration.

Photo Courtesy Westinghouse Electric



▼ BUTTERFLY VALVE, rubber sealed, 120 in. for Baltimore, Md.

Photo Courtesy B-I-F Industries

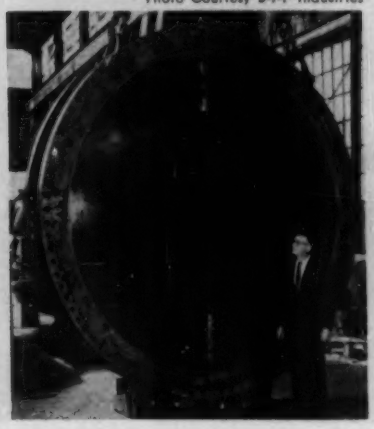
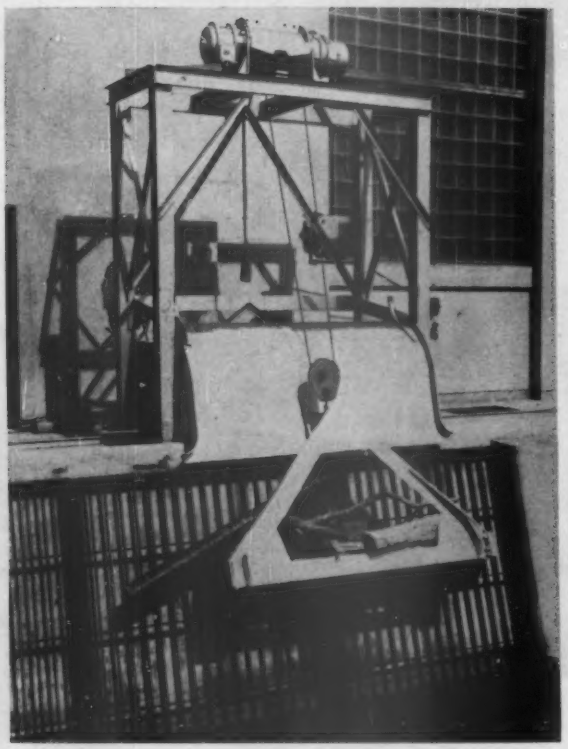


Photo Courtesy The Permutit Co.

▲ COLLOIDAIR SEPARATOR in operation at high-density insulation board plant, Trenton, N. J.

◄ SLUDGE SHREDDER simplifies handling and processing of dry sludge.

Photo Courtesy
Royer Foundry & Machine Co.



▼ SUBMERSIBLE Torque-Flow Pump With Non-Clay Impellers.

Photo Courtesy Western Machinery Co.

◄ TRASH RACK RAKE removes debris from intake trash racks.

Photo Courtesy Allis-Chalmers Mfg. Co.

▼ TELEMETERING FLOW TRANSMITTER for plant effluent flow, sewage treatment plant at Santa Ana, Calif.

Photo Courtesy The Foxboro Co.

Photo Courtesy Smith-Blair Co.

▲ FLANGED COUPLING ADAPTER with "O" ring seal.

HIGH VOLTAGE STARTERS installed at a mid-west sewage plant. ►

Photo Courtesy Allis-Chalmers Mfg. Co.

Photo Courtsey Globe Co.

▲ **CABLE TRAY facilitates plastic pipe installation at Squaw Peak plant, Phoenix, Ariz.**

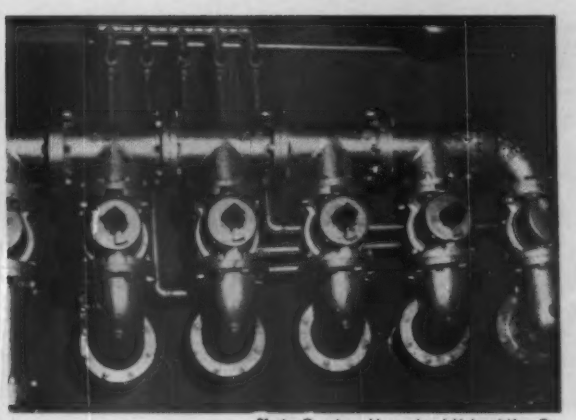
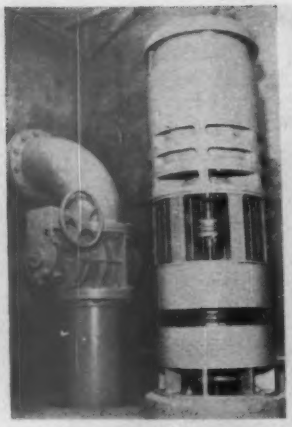


Photo Courtesy Homestead Valve Mfg. Co.

▲ **GROUPING OF PLUG VALVES on supernatant lines.**

◄ **SIXTY-INCH PIPE installed as part of St. Paul's $21½ million water improvement program.**

Photo Courtesy Bethelem Steel Co.

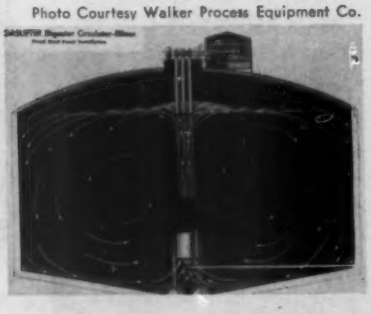


VERTICAL PUMPING UNITS installed at Vallejo, Calif. ►

Photo Courtesy
Electric Machinery Mfg. Co.

▼ **DIAGRAM OF GASLIFTER Digester Circulator - Mixer.**

Photo Courtesy Walker Process Equipment Co.



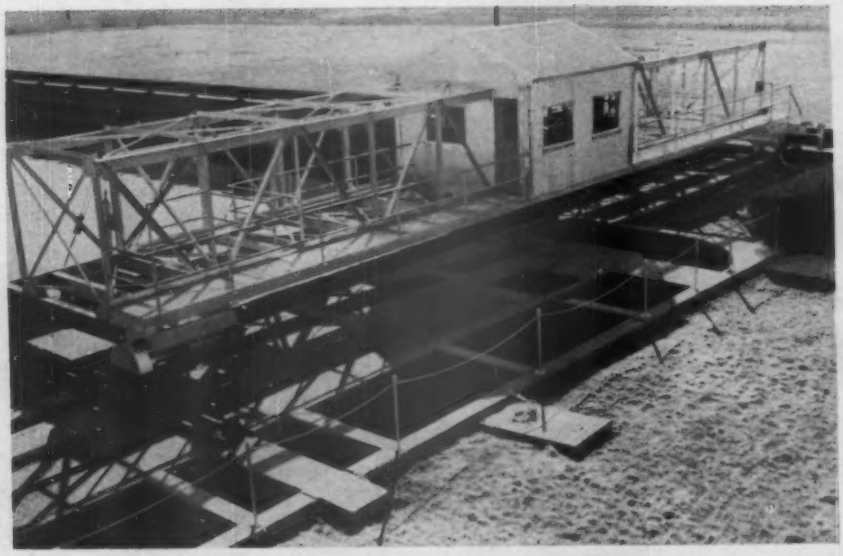
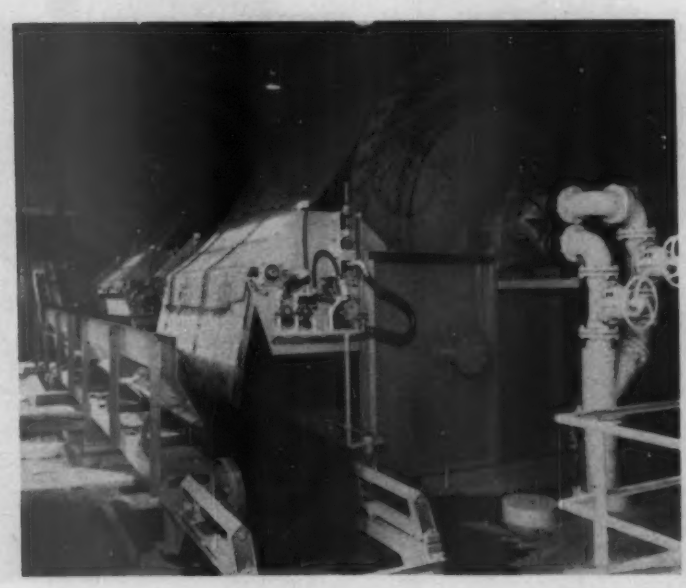


Photo Courtesy
Komline-Sanderson Engr. Corp.

◄ **SELF-PROPELLED Travelling bridge sludge collector spanning 75 ft. wide settling tank.**



CONTINUOUS BELT DRUM, Filters handle digested-elutriated sludge at Spokane, Wash. ►

Photo Courtesy Eimco Corp.

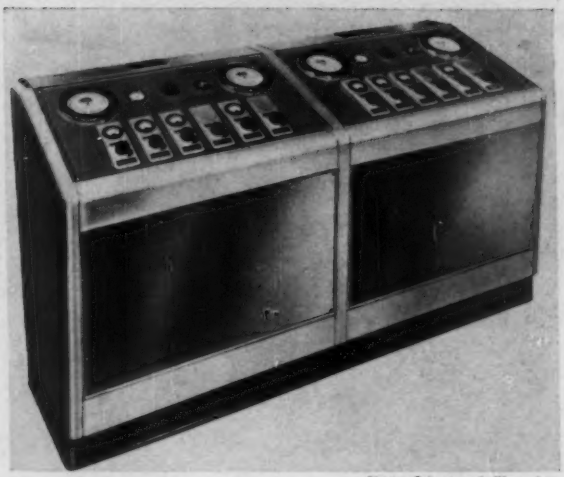
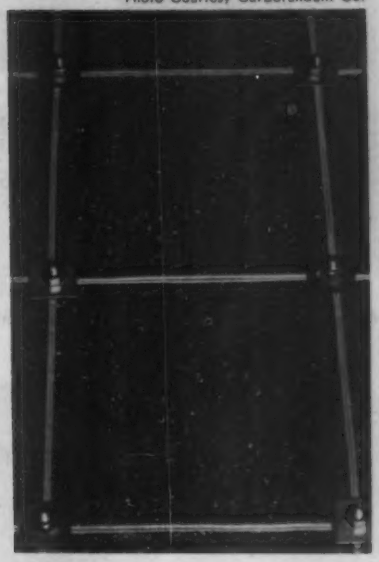


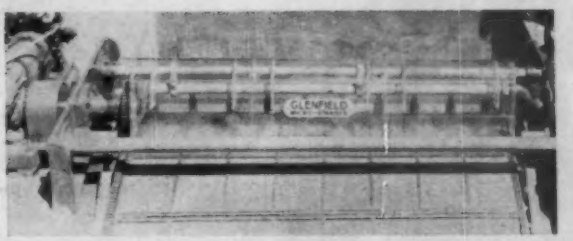
Photo Courtesy Infilco, Inc.

▲ DOUBLE PANEL FILTER operating console with electrically operated activators for hydraulic valves, rate of flow and loss of head gages.

▼ CONTOUR GASKETS for porous aluminum oxide underdrain plates, assures positive sealing between plates.

Photo Courtesy Carborundum Co.



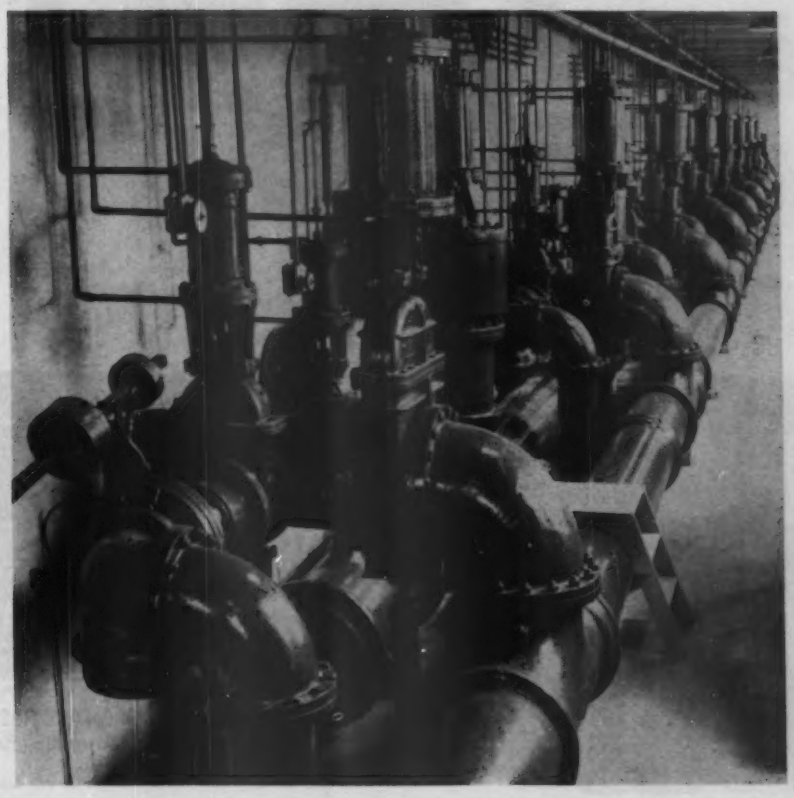


◄ MICROSTRAINER for 2 mgd of lake water at Estes Park, Calif.

Photo Courtesy Glenfield & Kennedy

Photo Courtesy Bailey Meter Co.

▲ FILTER OPERATING CONSOLE, part of a package control system.



CYLINDER OPERATED Valves in ► Concord, N. C., new filtration plant.

Photo Courtesy M & H Valve Co.

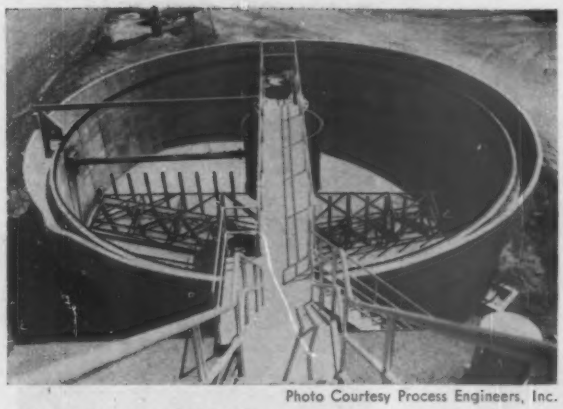


Photo Courtesy Process Engineers, Inc.

▲ SLUDGE THICKENER, sewage treatment plant at Riverside, Calif.

DRILLING, TAPPING AND INSERTING ► machine simplifies new installation problems.

Photo Courtesy Mueller Co.

Photo Courtesy Graver Water Conditioning Co.

▲ TRANSITE UNDERDRAIN offers maximum backwash efficiency with tangential upward flow.

Photo Courtesy Graver Tank & Mfg. Co.

◄ MILLION GALLON, radial cone bottom water tank for Hutchison, Kansas.

Photo Courtesy National Power Rodding Corp.

◄ PIPE CLEANING restores water main to original capacity.

Photo Courtesy Pittsburgh-Des Moines Steel Co.

▲ ORNAMENTAL RESERVOIR holding 5 million gallons, at Ross Township, Pa.

Nineteen years of experience is the basis for this report on . . .

Sewage Works Safety

by C. E. KEEFER*, Sewerage Eng.
Bureau of Sewers
Department of Public Works
Baltimore, Maryland

EDITOR'S NOTE: Very few cities can lay claim to nineteen years of experience in the operation of a safety program in their sewer department. Over the years a considered background of experience in accident and injury prevention has been acquired by the Baltimore Bureau of Sewers. This experience included that obtained unfortunately from having one serious non-fatal and two fatal accidents as well as that accumulated through careful investigation of every lost time accident. No one is more qualified to present some of the information in this fund then Mr. Keefer who has been chairman of the safety committee since its inception.

■ FOR MANY YEARS the safety of personnel has been a major concern of all types of industry. Management long ago realized that safety measures result in overall economy resulting from reduction in lost time and suffering. Just as industry has found it worthwhile to promote safety, the City of Baltimore has found it advantageous to carry on a safety program to protect and benefit its employees.

In 1937 the program was initiated in Baltimore under the direction of a safety supervisor. A clinic with a physician and a nurse was provided, for examining injured employees and giving first-aid. In the case of severe accidents the employee is taken to the nearest hospital in an ambulance.

This paper relates to the safety program carried out since 1937, under the general direction of the Division of Disability and Compensation Baltimore Bureau of Sewers. Shortly after this division was formed, safety committee of eight members with the author as chairman, was appointed to supervise a safety program for the Bureau of Sewers.

This committee holds bimonthly meetings. At these meetings safety policies are established, the causes of all injuries to employees that result in a loss of time are reviewed and steps initiated to eliminate these causes. Motion pictures that illustrate safety procedures are shown and topics such as fire prevention, the proper use of tools, hazards involving the use of electricity, the care and use of ladders, the precautions to take when working around explosive and poisonous gases, safety associated with the use of automobiles and trucks, the sheeting of pipe trenches and many kindred subjects are discussed.

In addition to the foregoing eight-man committee there are three sub-

*Contributing Editor, WATER & SEWAGE WORKS

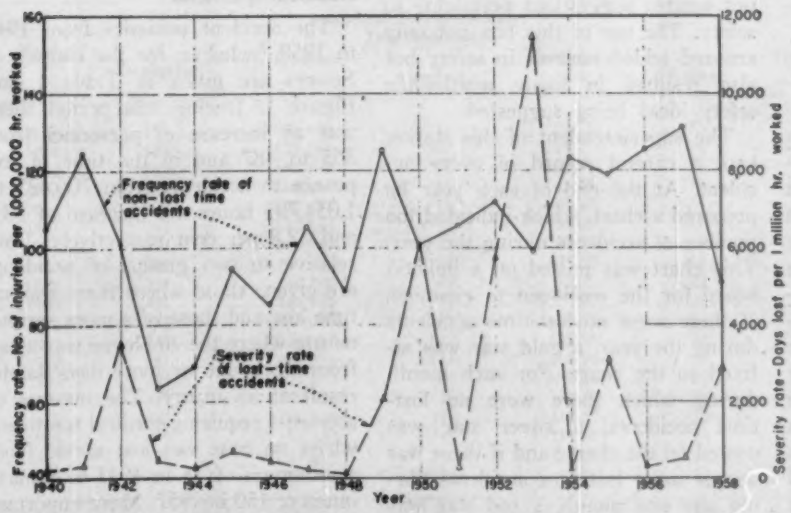


FIG. 1. ACCIDENT STATISTICS since 1940

FIG. 2. FACILITIES to give maximum protection to men working in the streets

committees. One directs the safety program relating to the operation and the maintenance of the sanitary sewers and the storm drains. The second deals with safety at the Back River sewage-treatment works, and the third is in charge of safety at the sewage and drainage pumping stations. The membership of the subcommittees consists of foremen, mechanics and laborers. At the subcommittee meetings hazardous conditions and the ways of eliminating them are discussed. Moving pictures, that depict some topic of safety, are sometimes shown. Talks on safety by the foremen or the supervisors are often scheduled. All of the employees are encouraged at these meetings to discuss any phase of safety and particularly to point out any hazardous conditions or unsafe operating procedures which they have observed.

Progress

Since the safety program was initiated in 1937 a great deal has been done to eliminate hazardous working conditions. Pipe rails have been erected along the top of tank walls and open pits. Additional lighting has been provided at places where it was previously inadequate. Platforms of adequate size have been installed so that employees can operate and maintain equipment with greater ease and safety. Stair treads have been coated with non-skid materials to prevent slipping. Grind stones and power saws have been provided with guards to protect the mechanics using them. Employees have been encouraged to wear safety shoes, and metal foot guards are provided where there is danger of dropping heavy objects. When doing certain kinds of work employees are required to wear safety goggles and eye shields. Safety hats are furnished men who work in trenches and other hazardous places. Gloves and mittens are supplied to protect workmen's hands. Gas masks and rescue breathing units are available where chlorine is used and when there is inadequate oxygen. Respirators are supplied men working in dusty atmospheres. Non-sparking tools are available in case work is done in the presence of explosive gases.

To stimulate safety at one of the sewage pumping stations where a number of men worked, a box was provided, into which employees could put written suggestions pertaining to safety. The use of this box not only aroused added interest in safety but also resulted in many worthwhile safety ideas being suggested.

The superintendent of this station kept a careful record of every accident. At the end of each year he prepared a chart, which indicated the number of accidents during the year. This chart was posted on a bulletin board for the workmen to examine. If there were no lost-time accidents during the year, a gold star was affixed to the chart. For each month during which there were no lost-time accidents, a silver star was posted on the chart; and if there was one or more lost-time accidents during any one month, a red star was posted.

Safe Design

It is not the intent to discuss the relationship between the good design of facilities and occupational hazards other than to point out a few general principles and their applications. Good design has an important bearing on the safety of sanitary sewers. It is desirable that the grades of these sewers be such that the velocities will be sufficient to prevent the deposition of solids and the formation of hydrogen sulfide, a gas as poisonous as hydrogen cyanide.

Good ventilation in sanitary and combined sewers is essential. This requirement can be obtained if one or more holes are provided in manhole covers and if each building which is connected to the sewerage system has one or more untrapped house stacks.

Pumping stations and the buildings at sewage-treatment works should be of fireproof construction. All electrical equipment and electrical construction should conform to the National Fire Underwriters Code. Electrical equipment should be explosion proof in the suction wells of pumping stations and in all places where atmospheres could contain explosive gases. Fire extinguishers should be provided and regularly inspected in buildings where fires may occur. Adequate lighting is essential both in buildings and outdoors around tanks, deep pits, etc. Handrails along the tops of tank walls, suction wells and stairways are essential.

Accident Statistics

The accident statistics from 1940 to 1958, inclusive, for the Bureau of Sewers are given in Table 1 and Figure 1. During this period there was an increase of personnel from 365 to 487 and in the time of exposure to accidents from 706,425 to 1,054,795 hours, an increase of 33.3 and 32.8 per cent respectively. Data relative to two groups of accidents are given: those where there was no time lost and those of a more serious nature where the employee was away from work one or more days as the result of an injury. The number of accidents requiring medical treatment where no time was lost varied from a minimum of 35 in 1943 to a maximum of 150 in 1957. More important than the number of accidents that

occurred annually where no time was lost was the rate of frequency of accidents. The frequency rate is the number of injuries per 1,000,000 hours worked. During the 19 year period the frequency rate has averaged 103.65 with a minimum of 63.53 in 1943 and a maximum of 131.39 in 1957. More significant than the cases where no time was lost were those where the employee was incapacitated for one or more days. The number of these accidents varied from a minimum of 14 in 1944 to a maximum of 38 in 1949 with an average of 22.3 for the 19-year period. One accepted way of evaluating these lost-time accidents is to determine the severity rate, which is the number of days lost per one million hours worked. The severity rate has varied widely from a minimum of 139 in 1948 to a maximum of 11,426 in 1953. The high severity rates in 1950 and in 1953 are due to one fatal accident in 1950 and two in 1953.

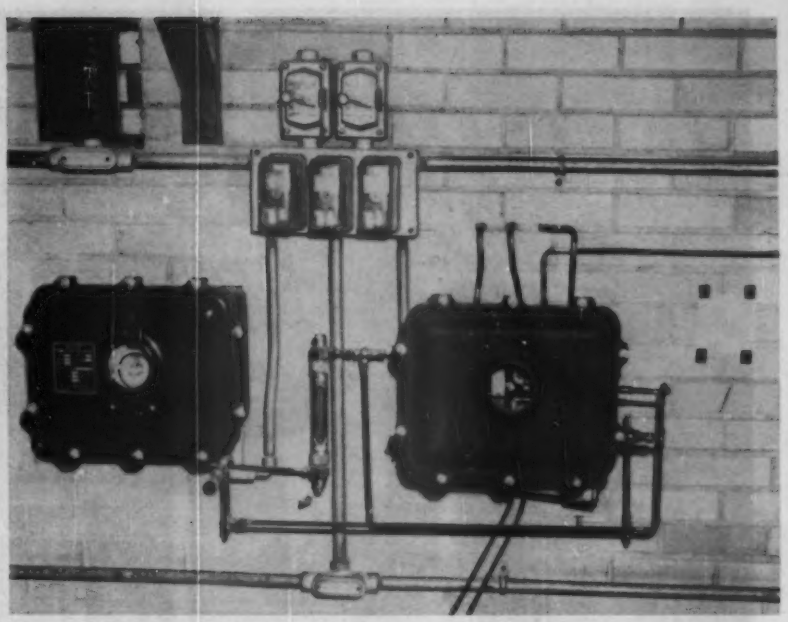


FIG. 3. AIR SAMPLES automatically collected at several points in the treatment plant building are pumped to this combustible gas analyzer which rings an alarm when it detects an explosive gas

When accidents are analyzed, it is evident that the vast majority of them can be prevented. Many accidents result from management not providing the proper working conditions or supervision; many on the other hand result from the carelessness of the worker himself. Three serious accidents, two of which were fatal, will be discussed. Two of these occurred at the Eastern Avenue sewage pumping station and the other one at the Back River sewage-treatment works.

Accident Experience

The non-fatal accident, which occurred at the Eastern Avenue sewage pumping station was the result of an employee drinking a small quantity of carbon tetrachloride. One very hot night while he was working in the coal tower of the building, he noticed a quart milk bottle, which he thought contained water but which contained carbon tetrachloride. This fluid had been used to clean one of the conveyor belts in the station. He claimed that he took one or two swallows of this chemical to quench his thirst. As a result of this accident he was hospitalized but eventually recovered. He was awarded $15,000 by

Table I.

ACCIDENT STATISTICS, BUREAU OF SEWERS, BALTIMORE, MD.

Year	Number of Employees	Exposure hr.	Medical Treatment cases (No time lost) Number	Frequency rate	Disabling Injuries Number	Frequency rate	Days lost	Severity rate
1940	365	706,425	74	104.75	15	21.23	202	285
1941	423	829,661	102	124.15	21	25.31	284	342
1942	347	696,292	70	100.53	15	21.54	2,386	3,427
1943	254	566,689	35	63.53	16	28.23	236	416
1944	232	520,193	36	69.20	14	26.91	119	229
1945	245	552,643	52	94.09	17	30.76	347	628
1946	294	664,560	57	85.77	26	39.12	275	414
1947	342	795,400	84	105.60	19	23.89	168	211
1948	382	890,300	79	88.73	22	24.71	124	139
1949	435	982,429	123	125.20	38	38.68	1,993	2,029
1950	438	1,024,095	103	100.57	26	25.39	6,308	6,160
1951	448	1,061,007	112	105.56	24	22.62	271	255
1952	448	1,088,631	114	111.96	21	19.29	6,241	5,733
1953	425	1,021,863	101	98.84	20	19.57	11,676	11,426
1954	477	1,115,856	138	123.67	28	25.09	259	232
1955	485	1,168,369	139	118.97	25	21.40	3,608	3,088
1956	479	1,151,850	145	125.88	28	24.31	371	322
1957	476	1,141,611	150	131.39	26	22.77	597	523
1958	487	1,054,795	96	91.01	22	20.85	2,975	2,820
Average				103.65		25.35		2,035

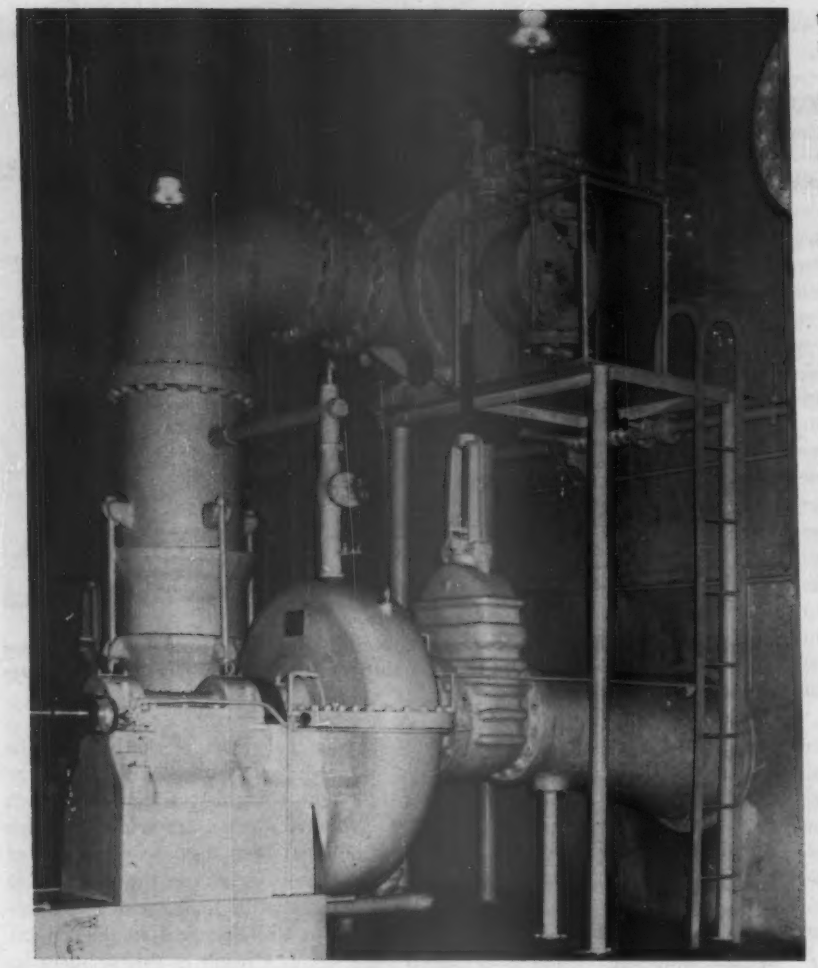


FIG. 4. ELEVATED PLATFORM to provide safe access to the cone valve.

the State Accident Commission.

This accident emphasized two things: first, milk bottles should not be used to store miscellaneous liquids; and secondly, carbon tetrachloride is a poison, which is absorbed by the skin and the fumes from which are most dangerous. The use of this material has been discontinued, and in its place chlorothene is used, a much less poisonous material. All containers in which chlorothene is stored are clearly marked "poison."

The second accident, which was fatal, also occurred at Eastern Avenue pumping station. In the boiler room of this station there are five overhead coal bunkers, each of which holds 250 tons and is 17 x 33 ft in plan at the top. The side walls of each bunker taper to an opening 18 in. square, through which the coal discharges to the furnaces of four steam boilers. Frequently the coal forms an arch above the outlets of the bunkers, restricting the free flow of coal. To remedy this condition two laborers would enter the top of the bunker to agitate the surface of the coal until it discharged from the bunker.

On one occasion when the flow of coal from one of the bunkers had practically stopped, two laborers were directed to go into the top of one of the bunkers to get the coal to flow again. One of the men climbed the stairway to the top of the boiler room and stepped over the wall of the bunker on the coal. That was the last time he was seen alive. A few minutes later the second man followed him up the stairway. When he got to the top, the first man was nowhere to be seen. Upon entering the coal bin the first man had undoubtedly disturbed the coal while walking on it with the result that he was inundated by a mass of coal. It was not until sometime later, after several hours of frantic effort, that his body was recovered from the outlet of the coal bin.

This fatality taught a few very important lessons, one of which was that certain important safety procedures had not been followed. After this accident no one was allowed to enter the coal bin without wearing a safety belt of a proper design, to which was attached a rope with two men holding it.

The third accident, which also cost a man his life, occurred in one of the buildings at the Back River sewage-treatment works where the final effluent was chlorinated. The operator, who was the only man in the building, regulated the chlorinating equipment and made his tests on a gallery, which was 14 ft above a lower floor. There was a pipe railing, 3 ft high around the edge of this gallery. Immediately adjacent to this railing there was a large table the same height as the railing, on which the operator kept his records and made his tests. One night it appears he climbed on the table, went to sleep, and rolled off the table over the railing to the floor below. His body was found some hours later. The State Accident Commission reviewed the case, ruled that the operator had not been adequately supervised and required the City to pay compensation to the man's widow.

Accidents such as these emphasize the fact that constant vigilance can never be relaxed if accidents are to be prevented. New employees who perhaps have never been exposed to accident prevention programs should receive instructions as to the hazards associated with their work, and the activities of long-time employees should be supervised to see that they follow proper working procedures. Every supervisor should always be on the alert to detect unsafe working habits and to assure himself that the equipment and the environment in which men work is conducive to safety.

The adoption of a comprehensive safety program in the Bureau of Sewers has been most worthwhile. The safe way of performing any operation has been found in the long run to be the most efficient way. The reduction in accidents has resulted in a saving to the taxpayer and in a decrease in suffering. Following the principles of safety has demonstrated its great value.

Attracting industry and insurance for community growth requires . . .

Progressive Water Works

by R. B. SIMMS, Supt.,
Spartanburg City and County Water Dept.

EDITOR'S NOTE: The author demonstrates the necessity of water and water service in support of community growth. Water resource development coupled with power, transportation, and available land are major selling items for attracting industry. Spartanburg County apparently counted their blessings long ago and have maintained a progressive approach toward community growth ever since. Water supply was not relegated to a secondary requirement in this approach.

■ SPARTANBURG COUNTY is not the largest county in the state of South Carolina but stands second in manufacturing volume, with several industries yet to start production. These include the multi-million dollar Kohler Company, plumbing fixture manufacturers, The Union Bag-Camp Paper Company, with over a million dollars invested, and Deering-Milliken Corporation who has just completed a large new laboratory and pilot plant. Faultless Rubber Company is beginning production and Jonathan-Logan Company will build a huge new dress factory. P. Garvin Company, waste processors, have a plant under construction. All of these manufacturers, when their plants are completed in 1959, will add quite a bit of industrial growth, not yet reflected in business volume statistics. Spartanburg will soon improve its business rating in the state.

Basis for Progress

There are several good reasons for Spartanburg's new forward thrust. The first is highway—two of them in fact. Interstate 85, main street of the South, (New York to New Orleans without a stop light), and Interstate 26, a Charleston-to-Chicago expressway (without a stop light), cross each other just west of the city. The point of intersection, which will be a great cloverleaf of roads, is at almost the exact geographical center of the county. Much of this enormous system of dual-lane, limited-access highways, is already in advanced stage of construction. The intersection of I-85 and I-26 is destined to become a focal point of a great center of urban commerce and industry.

The City is the hub of four railroads carrying industrial products in and out in seven distinct directions, making Spartanburg easily accessible to all markets of the nation and the coast, Altantic and Pacific, for foreign export and import.

Spartanburg County is traversed by two oil lines and two natural gas lines, making available competitive fuels for any and all industry.

The County of Spartanburg is most fortunate in its location in the foothills of the beautiful Blue Ridge Mountains. These mountains act as a buffer to the northerly and easterly winds. The rolling terrain of the Piedmont Section provides Spartanburg County with a climate to grow a peach crop that has become a multi-million dollar industry. The county produces, packs and ships more fresh peaches to national markets than any other section of the United States.

Spartanburg's steady growth during the past quarter century as the hub of this tremendous fresh fruit industry is testimony to the progressive growers and other leaders of the industry in this area of the Piedmont Carolinas.

Peach growers in Spartanburg County have turned to irrigation when there is no rain. Most systems in use soak three acres at a time with 28,000 gallons of water per acre. Irrigation costs $12 to $15 an acre. Water is essential also in hydro-cooling peaches, perhaps the greatest stride in shipping and packing that has come about. The hydro-cooler is a long tunnel-like machine which sprays chlorine-treated ice water over the peaches as they travel on a conveyor belt. Through this exposure to the ice-chilled water, the temperature is reduced from sunshine heat to about 45 degrees within a few minutes and the ripening process is instantly stopped. As a result, more mature, more highly colored and better sized fruit can be picked and shipped in top condition, therefore, earning for Spartanburg County the reputation of being the "Fresh Peach Capital of the World."

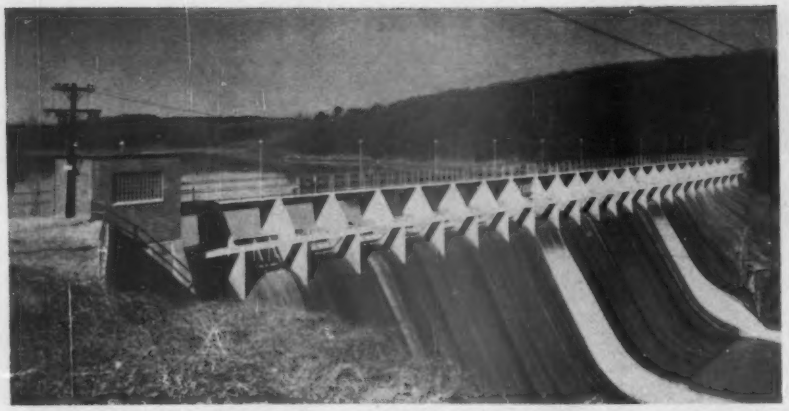


FIG. 1. RESERVOIR NO. 1 built in 1925. Reservoir No. 2, now nearing completion, will add an addition 9 bil. gal. to this storage to assure the county adequate supply.

Water Works Progress

The Spartanburg Water Works was founded about 1880 as a private system known as Home Owners Water Supply Company.

John B. Cleveland, a pioneer developer, builder and promoter of Spartanburg, was the owner and operator of the water supply company until 1908 when the city purchased the system for about $200,000. The operation was then turned over to the Commissioners of Public Works.

With a start of $200,000.00 in 1908 the system has grown to the present total expenditure of $7,044,990.22, with a Depreciation and Obsolescence Reserve of $1,990,585.10, leaving a net value of $5,054,405.12.

The first filtration plant and pumping station was built just outside the city limits but was abandoned in 1926 for the R. B. Simms Filtration Plant located 13 miles from the city adjoining Reservoir No. 1 (Fig. 1) on the South Pacolet River. The old building, built in 1906, has just been remodeled for a Maintenance and Construction Department.

The South Pacolet River, the source of Spartanburg's water, rises in the Blue Ridge Mountains and flows across a rich agricultural region. For this reason, it is necessary to completely coagulate turbidity in the water with alum and lime, followed by filtration through rapid sand filters. It is also necessary to treat the water chemically to prevent corrosion. This treatment is done with the use calgon and of soda ash for pH adjustment. Pre-chlorination is practiced for disinfection of the water.

A unique feature of the R. B. Simms Filtration Plant is its hydroelectric generating equipment. Because of the available head, two 500 KW generators were installed as auxiliary sources of power. Arrangements were made with the power company furnishing power to the plant, whereby they buy the excess power generated at times of high water. In this manner the generating equipment was amortized.

It is anticipated that in a normal rainfall period one half of the total power used by the plant during the year will be generated when Reservoir No. 2 is completed. Since this reservoir is under construction, plans are being made to up-date the generating equipment.

Plans

The plans and specifications for increasing the R. B. Simms Filtration Plant are being prepared. These plans call for raising the plant capacity from 16 to 19 million gallons per day. In addition, studies have been made to program future additions to the present site. These studies show that at the present plant location, it will be possible to ultimately develop a plant capable of supplying Spartanburg with 40 million gallons per day.

Planning and foresight have shown their effect over the years. The city water facilities grew from a 1.27 MGD plant in 1921 to a 15 MGD plant in 1958. Engineering reports show that by 1972 it will be necessary to have a plant having a capacity of at least 23.6 MGD.

The idea of Water Districts was conceived years ago and the public was gradually educated to the necessity of pure and ample water rather than unreliable individual supplies. An example of the type of information supplied to the public is shown as a full page illustration. The Spartanburg County Delegation agreed to loan each district an ample amount of money to make an Engineers' Study and passed special bills giving each district the right to construct, maintain, operate and purchase water service. Each district was outlined by Engineers. The method employed usually consisted of taking a known highway to serve as a right-of-way for the feeder line to the area, and including a half a mile on each side of the highway. In some cases as much as two miles on each side of the highway was designated from a point both convenient and economical for the district. Financing was authorized by general obligation and revenue bonds, and so far, the general obligation bond tax levy has not been too excessive.

Five districts started off with 20 inch water mains from the plant. These, of course, get down to the smaller sizes with distance from the city. Cowpens, which is well within a 10 mile radius, was an exception. The extreme distance for any district is within a 25 mile radius of the plant.

Spartanburg City and County authorities and the Spartanburg Water Works Commission realized that no manufacturer is willing to spend capital investment in an area before a well-established ample, accredited water supply is present. It is an accepted fact that water is a commodity that no one can do without.

The Spartanburg Water Works has ample water for the industries now located in the county and can still readily serve additional industry, either direct from the city, or from any of the districts. The facilities at the present time are ample to serve additional industrial expansion while meeting the needs of those factories nearing completion under the 1959 development.

The Water Works Commission is now constructing an additional storage reservoir of 9 billion gallon capacity and preparing to add more facilities to its treatment plant. These improvements will be completed in the year 1959.

The following page illustrates how Spartanburg aggressively advertises its facilities.

Spartanburg City and County Life Lines for Health, Happiness and Prosperity of the Future

Huge Reservoir No. 2 Scheduled For Completion in October, 1959

The new Spartanburg Water Works Reservoir No. 2, covering almost 2,000 acres of land is now approximately 45% completed, with full completion scheduled for October, 1959. The lake will be 9 miles long and over a mile wide in 2 or more places.

The overall length of the dam will be 673. ft. When completed, the lake and dam will store 9 billion gallons of water . . . assuring Spartanburg County of continued growth and prosperity.

Report To The Public On The Condition of The Spartanburg Water Works At The Close of Business June 30, 1958

ASSETS

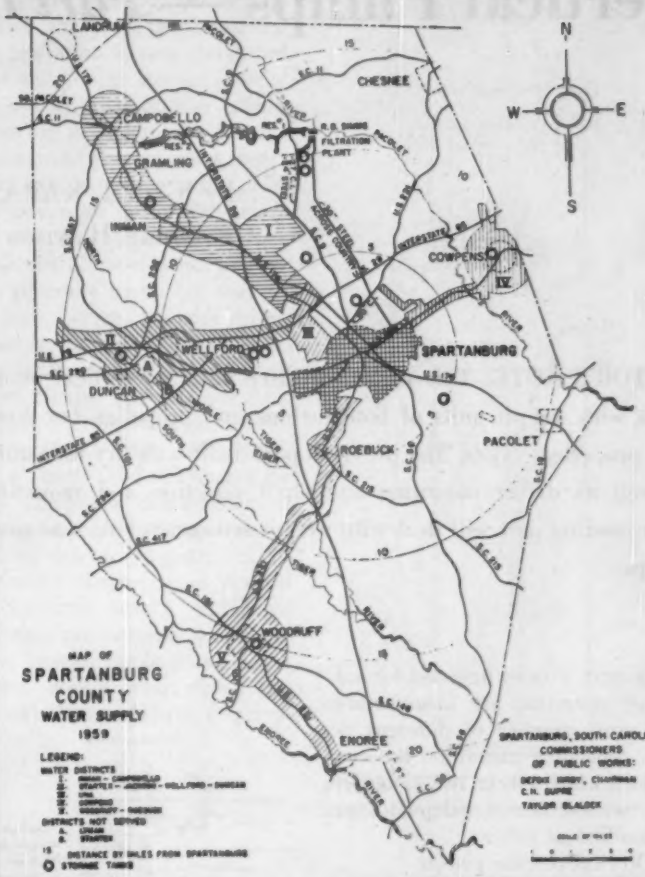
	1957	1958
Cash on hand and in banks	$ 458,094.23	$ 312,098.90
Accounts and notes receivable	59,794.74	67,355.98
Inventories, supplies and materials on hand	28,477.42	13,089.82
Investments	297,774.76	1,487,346.97
Property less reserves	4,441,070.81	5,054,405.12
Deferred charges unexpired insurance	8,428.17	5,516.83
TOTAL ASSETS	$5,293,640.13	$6,860,713.54

LIABILITIES

Current accounts	$ 50,546.46	$ 57,974.19
Bonded debt	2,495,000.00	3,787,000.00
Reserves	530,076.66	1,398,196.35
Surplus, excess of assets over liabilities & reserves	2,218,017.01	1,618,443.00
TOTAL LIABILITIES AND SURPLUS	$5,293,640.13	$6,860,713.54

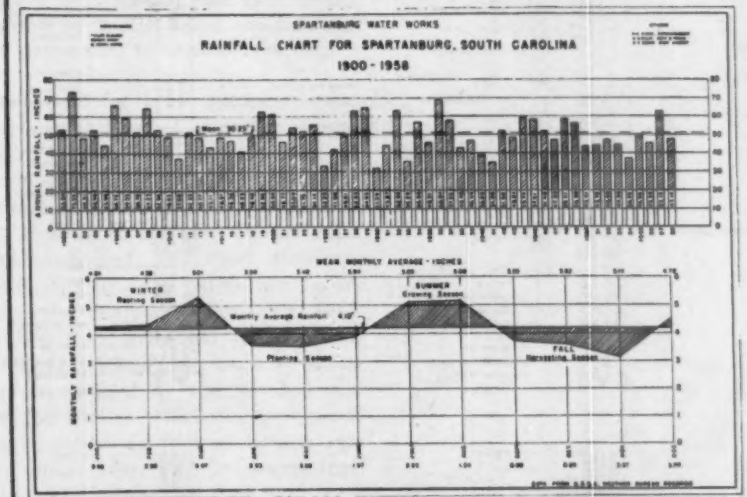
Statement of Operation for Year Ending June 30, 1958

Operating revenue	$ 613,626.46	$ 736,783.46
Operating expenses	296,000.77	388,481.32
Balance before charging depreciation	$ 317,625.69	$ 476,302.34
Depreciation	117,080.22	129,254.11
Net operating income	200,545.47	$ 347,048.13
Other income credits	18,707.87	21,867.27
GROSS INCOME	$ 219,253.34	$ 368,915.40
Other income charges:		
Interest on bonded debt	$ 66,689.41	$ 190,369.72
Paid to reduce bond indebtedness	$ 82,000.00	$ 108,000.00
Surplus after bonds paid	$ 70,563.93	$ 160,545.68



City and County Cooperation In Action

The above map shows the entire Spartanburg County Water Supply. This outstanding accomplishment assuring the future growth and development of Spartanburg County has been brought to a realization by the foresight and united effort of The Senator, County Delegation, The Mayor, City Council, The Commissioners of Spartanburg Water Works and The Commissioners of the various Water Districts throughout Spartanburg County.



The above chart shows the amount of rainfall measured at Spartanburg and The R. D. Simms Filtration Plant during the past 59 years. The top portion shows the year by year rainfall and the bottom portion shows the average rainfall per month for the 58-year period.

Pipe and Hydrants Before City Expansion
1,221,242 ft. or 231.30 miles of pipe
847 hydrants

LAID FOR CITY LIMIT EXPANSION:
143,611 ft. or 27.20 miles of pipe
199 hydrants
cost of $638,891.65

TOTAL TO 1959
Inside City:
1,364,853 ft. or 258.49 miles of pipe
1,046 hydrants

Outside City:
336,701 ft. or 63.77 miles of pipe
501 hydrants
427 meters added to the system

SPARTANBURG WATER WORKS

Spartanburg, South Carolina

Part 17 of this series on centrifugal pump design, construction and maintenance continues the subject of . . .

Vertical Pumps — *Part II*

by IGOR J. KARASSIK, Consulting Eng. and Manager of Planning, Harrison Div., Worthington Corp., Harrison, N. J.

EDITOR'S NOTE: This second of three parts on vertical pumps deals with wet-pit units of both turbine and propeller (or modified propeller) types. The previous part dealt with dry-well units, as well as driver mounting and shaft selection and mounting. A succeeding part will deal with wet-pit sewage, volute, and sump pumps.

■ VERTICAL PUMPS intended for submerged operation are manufactured in a great number of different designs, depending mainly on the service for which they are intended. Thus, wet-pit centrifugal pumps can be classified as follows:

1. Verical turbine pumps.
2. Vertical wet-pit propeller or modified propeller pumps.
3. Wet-pit sewage pumps.
4. Wet-pit volute pumps.
5. Sump pumps.

Vertical Turbine Pumps

Vertical turbine pumps were originally developed for pumping water from wells; they have been called deep well pumps, turbine well pumps, or borehole pumps. As their application to other fields has increased, the name "vertical turbine" pumps has been generally adopted by the manufacturers. (This is not too specific a designation because the term "turbine" pump has been applied in the past to any pump employing a diffuser. There is a tendency to designate pumps using diffusion vanes as "diffuser" pumps, as against "volute" pumps. As that designation becomes more universal, applying the terminology of vertical turbine pumps to the construction formerly called turbine well pumps will become more specific.)

The largest field of application for this type of pump is pumping from wells for irrigation and other agricultural purposes, for municipal water supply and for industrial use for processing, circulating, refrigerating and air conditioning water supplies. In addition, this type of pump has

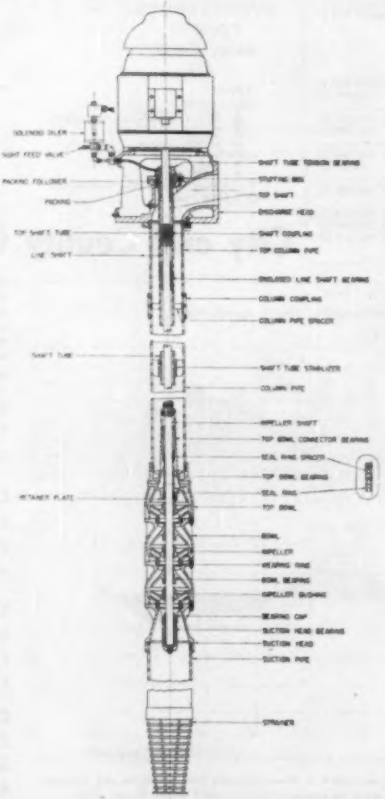


FIG. 1. SECTION of vertical turbine pump with closed impellers and enclosed line shafting for oil lubrication.

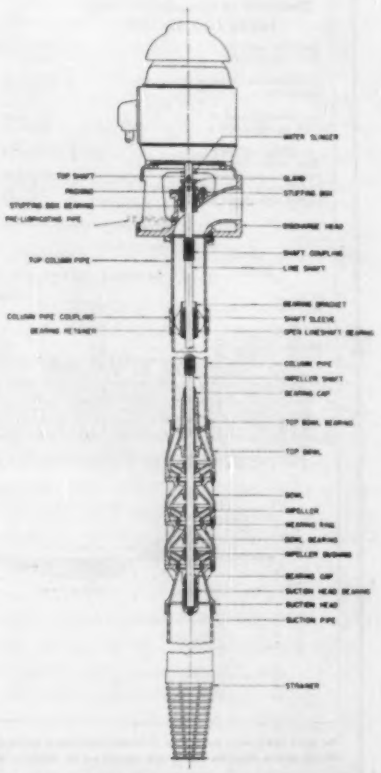


FIG. 2. SECTION of vertical turbine pump with closed impellers and open line shafting for water lubrication.

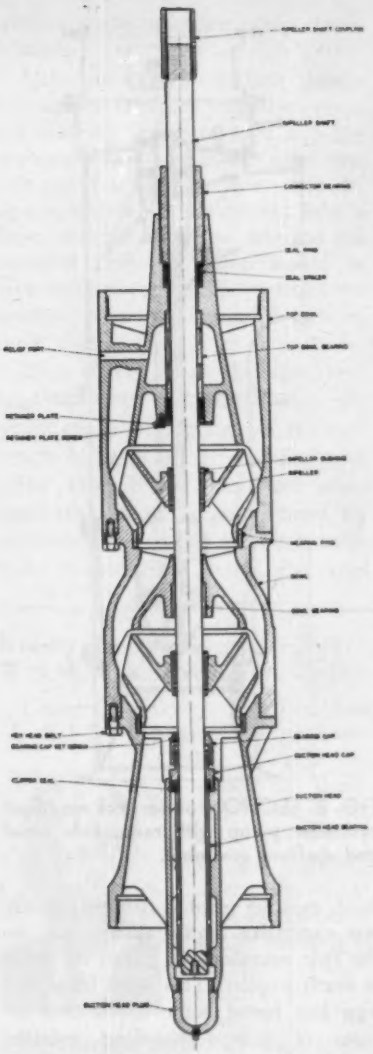


FIG. 3. SECTION of bowl of a vertical turbine pump with closed impellers and for connection to enclosed shafting.

been used for brine pumping, mine dewatering, oil field repressuring, and other applications.

These pumps have been made for capacities as low as 10 or 15 gpm and as high as 25,000 gpm or more and for heads up to 1,000 feet. Most applications of these pumps are naturally for the smaller capacity field. When they are used for pumping from bored wells, the capacity is naturally limited by the physical size of the well in which the pump will be installed, as well as by the rate at which water can be drawn from the well without lowering the water level to the point where there is insufficient submergence.

In a vertical turbine pump it is desirable to have a provision so that the shaft can be readily raised or lowered from the top, in order that the position of the impeller in the bowl can be adjusted properly. In addition, it is necessary to have an adequate thrust bearing to support the vertical shafting, the impellers, and the hydraulic thrust developed when the pump is in service. As the driving mechanism must also have a thrust bearing to support its vertical shaft, it is usual to provide a thrust bearing of adequate size in the driving mechanism to carry the pump parts as well. For these two reasons, the hollow-shaft type of motor or gear is most generally used for vertical turbine pump drive. In addition to the hollow shaft motor or gear drive, these pumps are sometimes built with their own thrust bearings for belt drive and for drive through a flexible coupling by a solid shaft motor, gear or turbine. Dual-driven pumps generally employ a combination of an angle gear with a vertical motor mounted on top of the gear.

Structurally, the design of vertical pumps illustrates how a centrifugal pump design can become specialized to meet a specific application. Fig. 1 shows one design with closed impellers and enclosed line shafting;

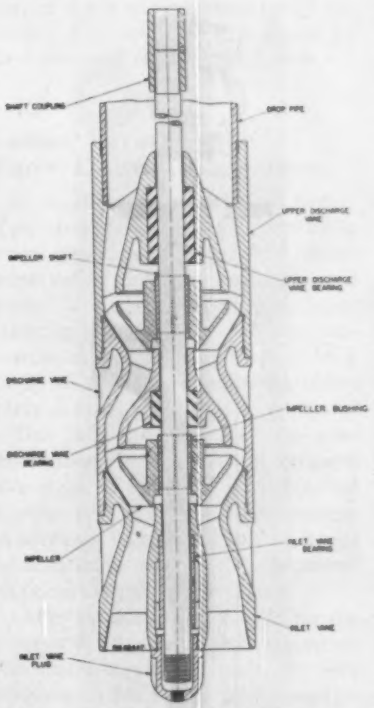


FIG. 4. SECTION of bowl of a vertical turbine pump with open impeller and for connection to open line shafting.

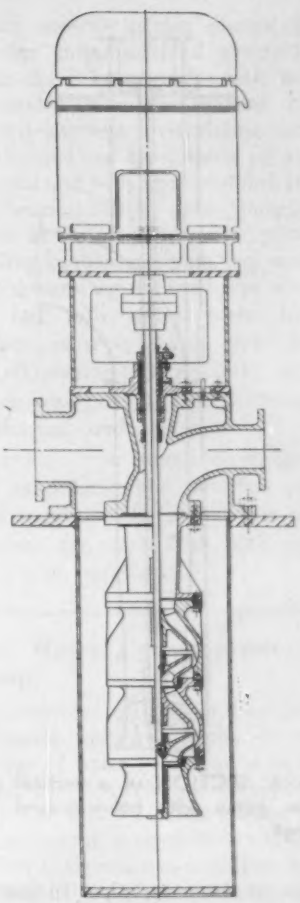


FIG. 5. SECTION of a vertical turbine "can" pump for condensate service.

Fig. 2 shows another design with closed impellers and open line shafting.

The bowl assembly or section consists of the suction case (also called suction head or inlet vane), the impeller or impellers, the discharge bowl, the intermediate bowl or bowls (if more than one stage is involved), the discharge case, the various bearings, the shaft, and the various miscellaneous parts (keys, impeller locking devices, etc.)

The column pipe assembly consists of the column pipe itself, the shafting above the bowl assembly, the shaft bearings, and the cover pipe or bearing retainers. The pump is suspended from the driving head, which consists of the discharge elbow (if above-ground discharge), the motor or driver support, and either the stuffing box (in case of open shaft construction) or the assembly for providing tension on the cover pipe and for providing the introduction of lub-

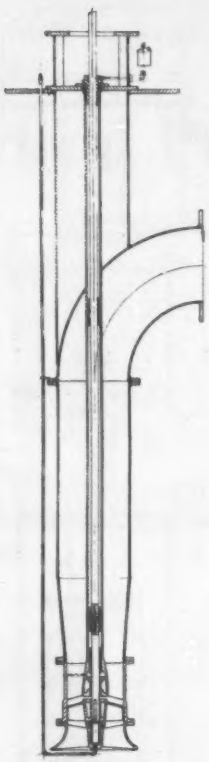


FIG. 6. SECTION of a vertical propeller pump with below-ground discharge.

ricant to the cover pipe. In case of below-ground discharge, the discharge is taken from a tee in the column pipe and the driving head functions principally as a stand for the driver and the support for the column pipe.

In a vertical turbine pump the liquid is guided into the impeller by the suction case or head. This may be a bell mouth (as in Fig. 5) or a tapered section (as in Figs. 3 and 4) for attachment of a conical-type strainer or a suction pipe.

Semi-open and closed types of impellers are both commonly used. For proper clearances in the various stages the semi-open type requires more care in assembly on the impeller shaft and requires more accurate field adjustment of the vertical shaft position in order to obtain the best efficiency. In addition, enclosed impellers are favored over semi-open because wear on semi-open impellers reduces capacity, which cannot be restored unless new impellers are installed.

Normal wear on enclosed impellers does not affect impeller vanes, and worn clearances may be restored by replacing wearing rings. The thrust produced by open impellers may be as much as 150 percent greater than with enclosed impellers, due to the relative unbalanced thrust characteristics of the two styles.

Occasionally in power plants, especially in cases where a unit is to be installed in an existing plant in a space originally allotted for a smaller size unit, the maximum level that can be carried in the condenser hotwell will not give adequate NPSH (net positive suction head) for conventional horizontal condensate pump mounted on the basement floor. To build a pit for a conventional horizontal condensate pump or a vertical dry-pit type in order to provide sufficient submergence would involve considerable expense. In some cases vertical turbine pumps of the design shown in Fig. 5 have been used. This is basically a vertical turbine pump mounted in a tank (often called a can) sunk into the floor. The length of the pump must be such that sufficient NPSH is available for the first-stage impeller design; the diameter and length of the tank must allow proper flow down the space between the pump and tank and then turn and flow into the bell mouth. Installation of such a design in an existing plant is naturally much less expensive than making a pit, as the hole necessary to install the tank is much smaller. This same basic design has found some application in cases of pumps handling volatile liquids where the layout of equipment does not provide sufficient NPSH for pumps mounted on the operating floor.

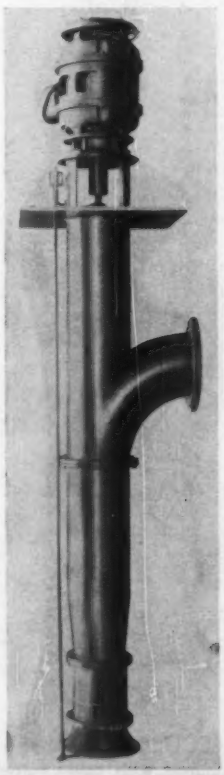


FIG. 7. VERTICAL propeller pump.

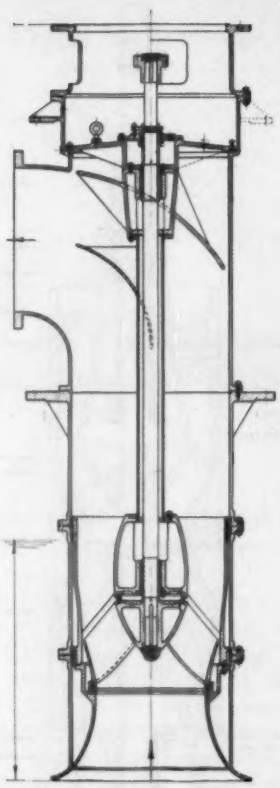


FIG. 8. SECTION of vertical modified propeller pump with removable bowl and shafting assembly.

Vertical Propeller Pumps

Originally the term vertical propeller pump was applied to vertical wet-pit diffuser or turbine-type pumps using a propeller or axialflow-type impellers, usually installed in an open sump and having a relatively short setting. For operating heads in excess of those which can be met with a single-stage axial-flow impeller, two or more stages might be used or a single-stage lower specific speed type of pump with a mixed-flow impeller might be used. If the operating head is high enough, a pump with mixed-flow impellers in two or more stages might be used. For lack of a suitable name, these higher head designs have been more or less generally consid-

ered as in the propeller pump classification.

Although vertical turbine pumps and vertical modified propeller pumps are basically the same type and hydraulically could be of the same specific speed, a basic turbine pump design would be one that could have a large number of stages, whereas the modified propeller pump would be of a mechanical design basically intended for a maximum of two or three stages.

Most of the wet-pit drainage, low-head irrigation and storm water installations employ pumps of the conventional propeller or modified propeller type. There has been some application of this type of pump for condenser circulating service; however, a specialized design has been primarily used for this field. Large power plants generally are located at centers of population, and as a result frequently have to use badly contaminated water, both fresh and salt, as a cooling medium. With such water, a fabricated steel column pipe and elbow would give short life, and cast iron, bronze, or even a more corrosive resisting cast metal, must be used. This results in a very heavy pump when large capacities are involved. To avoid the necessity of lifting this large mass when the rotating parts need maintenance, some designs (one of which is illustrated in Fig. 8) are built so that the impeller, diffuser and shaft assembly can be removed from the top without disturbing the column pipe assembly. These designs are commonly designated as of the "pull-out" type.

Like vertical turbine pumps, the propeller and modified propeller pumps have been made with both open and enclosed line shafting. Except for condenser circulating service, the enclosed type, using oil as a lubricant and with a grease-lubricated tail bearing below the impeller, seems to be favored. For pumps handling condenser circulating water, some designs use enclosed-type shafting, but with water, often from another source, as a lubricant, thus eliminating any possibility of oil getting into the circulating water and coating the condenser tubes.

Propeller-type pumps have open-type propellers. The modified propeller pumps with mixed-flow-type impellers are made with both open and closed impellers.

Kelsey Becomes W.S.W.M.A. President

George W. Kelsey, Vice-President of B-I-F Industries, Providence, R. I., was installed as President of the Water and Sewage Works Manufacturers Association, December 8, at the meeting of the Board of Governors held in New York City. Last year, he served as Vice President of the organization.

On his installation as President, Mr. Kelsey declared he was confident that the organization's expanded public relations program will enhance the service the W. S. W. M. A. renders the men who design, construct and operate water works and pollution control facilities, and, "through them, the service we render the citizens and industries throughout our country, and so many foreign nations."

Mr. Kelsey has represented B-I-F Industries on the W.S.W.M.A. for the past five years. His firm has been a member of the Association for over fifty years. The new president has been active in many technical organizations including, the American Water Works Association, the Water Pollution Control Federation of which he was Director from 1951 to 1956, and the American Society of Mechanical Engineers.

His association with B-I-F began in 1938 when he joined the company as an industrial sales manager. He was elected a Director in 1944 and assumed his present duties as Vice President in 1947. Recently, Governor Christopher DelSesto of Rhode Island appointed Mr. Kelsey to the Board of Trustees of State Colleges. In 1957, Mr. Kelsey served as Chairman of the National Resources Conference, conducted in Providence by the College of the Armed Forces.

Kansas Mayors Make Water Control Suggestions

A recommendation that the Federal government set up a loan agency to serve municipalities building water conservation facilities was submitted to the United States Senate Select Committee of National Water Resources at a meeting in Topeka by a group of mayors representing about thirty Kansas cities.

The municipal leaders also proposed that the Federal government take steps to eliminate jurisdictional disputes between various governmental bureaus. To accomplish this, it was recommended that the government adopt an overall water policy.

Other proposals made were for the government to set up water conservation districts on the basis of river basins, and that a Federal appropriation for joint state and U.S. Geological Survey studies of individual state water problems be legislated.

First Water Conservation Stamp

A four-cent commemorative postage stamp calling attention to the urgency of water conservation in the United States will be issued April 18, 1960. The stamp's formal release will be made at the Seventh National Watershed Congress which will be held April 18-20, in Washington, D. C.

The Congress is an annual forum concerned with water and related resources. It is sponsored by twenty-five national farm, business, industrial and conservation organizations.

The announcement of the new stamp's issuance disclosed that a total of 120 million will be printed.

Booklet Available

The Air Pollution Foundation, San Marino, California has published report #28 "Elimination of Oxide of Nitrogen from Automobile Exhaust" prepared by the Franklin Institute.

The report is concerned with the possibility of removing nitric oxide from automobile exhaust by catalytically reducing with carbon monoxide or hydrogen gases present in the exhaust. Experiments are presented showing removal of NO_2, CO and hydro-carbons from actual automobile exhaust.

The report is available from the Air Pollution Foundation, 2556 Mission Street, San Marino, California.

What are equitable rates and charges for . . .

Sewer Service Cost *to industry*

by GEORGE K. ERGANIAN, Exec. V.P.
Henry B. Steeg & Assoc., Inc.

EDITOR'S NOTE: The subject of equitable charges for sewer services to industry has received considerable attention. The literature contains many reports on rate structures based on volumes and concentrations of the wastes involved. In the State of Indiana, rates are established strictly on a water usage basis.

By presenting a hypothetical situation the author shows the inequities of this method and how water usage rate structures adversely affect commercial and industrial consumers.

■ THE DEVELOPMENT of rate structures has for the most part followed the reasoning that the rates and charges are intended to cover the cost of constructing and operating a sewage treatment plant and interceptor sewer system. Under this condition the development of a rate structure based on volume of flow, and including surcharge rates for abnormal concentrations of industrial wastes is reasonable. Methods of determining these surcharge rates to industry involve the allocation of the cost of both the construction and operation of the facilities required for handling 1) flow, 2) solids, and 3) BOD.

Examples of computations presented in the literature are worthy of attention and understanding, since they represent rational methods of allocating the fair cost of waste treatment to the industries involved. While it is not the intention of this paper to discuss this phase of rate making, it might be noted, in the way of confirming the opinion of other authors, that the use of a surcharge formula has certain practical limitation, particularly from the administrative cost angle, and as a result there are very few instances of such surcharge rates being imposed on industry in Indiana.

The principal concern of the writer and the theme of this text is the fact that there has been a gradual distortion of the basic premises of rate making for sewer service in Indiana. For years the fact has been recited that the cost of constructing and operating a sewage works is directly related to flow and concentration of wastes to be treated and that equitable charges to a customer for the service should therefore be based on the volume and concentration of wastes discharged by that customer. In order to describe some of the inequities which may arise from the indiscriminate use of this philosophy, it is necessary to first describe the statutes under which municipal sewage works projects are being built and financed in Indiana. The fact this discussion regards conditions as they exist in Indiana is stressed. Methods of financing vary from state to state, and the conditions to be described may or may not apply in other areas of the country.

Practically all of the cities and towns in Indiana, (with the exception of Indianapolis, Gary, Richmond, East Chicago, and Hammond, which operate as Sanitary Districts) have financed the construction of sewage treatment facilities hrough the issuance of sewage works revenue bonds, under the authority of the Sewer Service Charge and Revenue Bond Act, Chapter 61, Acts of 1932. This Act has been amended and supplemented in practically every session of the legislature since the special session of 1932.

While the Revenue Bond Act was enacted originally to provide a method for cities and towns to finance the cost of interceptor sewers and sewage treatment facilities, the authority to ". . . construct, own, equip, operate, maintain and improve works for the treatment and disposal of sewage . . ." was soon implemented by an amendment to the original Act which defined the term *works* to include not only the sewage treatment plant and interceptor sewers, but also main sewers, submain sewers, local and/or lateral sewers, outfall sewers, force mains, pumping stations, ejector stations and all other appurtenances necessary or useful and convenient for collection and treatment of sewage.

A revenue bond financed sewage works project will (except under certain rare circumstances) include the construction of, or improvements to, a sewage treatment plant. In addition, however, it may (and very often does) include trunk sewers, relief sewers, and local sewers. If the original system was of the *combined* type, that is, one sewer providing for the collection of both surface water and sanitary sewage, then the proposed sewer extensions or relief sewers may also be combined sewers.

In the author's opinion the enlargement of the scope of the Act, was a

Presented at 14th Industrial Wastes Conference, Purdue University, printed here with permission.

perfectly reasonable and normal process of evolution. Plants and interceptor sewers were being readily financed to serve existing sewered areas, but municipalities found themselves with large portions of their community remaining either totally unsewered or inadequately sewered. In many communities it was almost, if not actually, impossible to undertake major sewer system expansion projects under available methods of financing. Regardless of one's position as a citizen, as a public health officer or as a municipal official, this situation had to be resolved, and the simplest method was to enlarge the scope and intent of the Revenue Bond Act.

Under the present broad interpretation of the Act, many projects today include the cost of sewers, other than interceptor sewers, which may equal or exceed the cost of the treatment facilities. It is this particular type of project in which the application of rates based on water use sometimes result in an injustice to some large water using industries. To illustrate this, a hypothetical case is described as follows:

A City of say 10,000 population is undertaking the construction of a sewage works project which will cost as follows:

Plant	$ 500,000
Interceptor	$ 200,000
Trunk Sewers	$ 500,000
Relief Sewers	$ 800,000
Project Cost	$2,000,000

This type of project might conceivably be undertaken by a rapidly growing community whose immediate needs include: 1) a sewage treatment plant and interceptor sewer, 2) the extension of trunk sewers to newly annexed areas, and 3) the relief of existing main trunk sewers.

In this case, it is assumed that existing water rates are extremely low, and as often happens in such cases, the spread between the high and low brackets as shown is not very great. These rates are:

First 5,000 gal. @ 15c 1000 gal.
Next 20,000 gal. @ 12c 1000 gal.
Next 25,000 gal. @ 10c 1000 gal.
Over 50,000 gal. @ 9c 1000 gal.
Minimum Rates: 45 cents per month for 3000 gal.

In this particular community it is assumed that there are 2940 residential and commercial customers, using an average of 4000 gal of water per customer per month. In addition to this, it is assumed that there are 123 industrial customers with the following average water consumption requirements:

Customers	M G D of Water
1 using	0.2
1 using	0.05
10 each using	0.01
111 each using	0.001

Based on the project cost previously illustrated, annual revenue requirements might be:

Amortization of Plant and Interceptor	$ 58,000	
Operating Cost of Plant	22,000	$ 80,000
Amortization of Cost of other Sewers	$108,000	$108,000
Total Annual Revenue Required		$188,000

Volume of flow received at the plant is assumed at 1 mgd, broken down as follows:

Residential and Commercial	0.392 MGD
Industrial	0.461 MGD
Infiltration & Unaccounted	0.147 MGD
Total Flow to Plant	1.000 MGD

Revenue required to meet the cost of amortizing the investment and the cost of operation and maintenance is $188,000 per year or approximately five times the revenue from the sale of water. Following a commonly employed procedure, the sewer service charge rate structure is established by retaining the same water rate blocks and increasing the charge per 1000 gal by five times. The rate structure for sewer service charges is then:

First 5,000 gal/mo. @ 75c 1000 gal.
Next 20,000 gal/mo. @ 60c 1000 gal.
Next 25,000 gal/mo. @ 50c 1000 gal.
Over 50,000 gal/mo. @ 45c 1000 gal.
Minimum charge $2.25/mo.

Assuming the average amount of water consumed per residential customer is 4000 gal, average residential rates will be $3.00 per month and total revenue received per year from the 2940 residential and commercial customers $106,000. The remaining $82,000 per year will be derived from the 123 industrial customers as follows:

1 at 0.2	MGD @ approx.	45c/1000 gal. =	$32,400/yr.
1 at 0.05	MGD @ approx.	46c/1000 gal. =	8,300/yr.
10 at 0.01	MGD @ approx.	47c/1000 gal. =	16,900/yr.
111 at 0.001	MGD @ approx.	61c/1000 gal. =	24,400/yr.
		Total	$82,000/yr.

Statistical Summary of Situation

Predicated on the assumed conditions heretofore established, the following significant statistics shown in Table 1, can be computed.

Discussion of Statistics

On the premise that the cost of trunk sewers, and general relief sewers are costs of general benefit which should be shared by the whole community on an ad valorum tax basis, the previous computations might be utilized to examine the equity of the rate structure to major water using industries of the community.

For instance, the principal industrial water consumer of this hypothetical community paid $2700 per month for sewer service, or a total of $32,400 per year. Since 51.5 per cent of this revenue would go toward the cost of trunk and relief sewers, this industry would be paying $16,700 per year toward the cost of these general improvements. Assuming that these general improvements had been paid for by taxation, the assessed valuation of this industry would have had to be $1,940,000 in order to raise the amount of $16,700 by an 86 cents/$100 tax levy (the same tax levy computed for the average residential customer).

On the same basis, the industry using 50,000 gal per day of water would have had to have an assessed valuation of $555,000; the industry using 10,000 gallons per day, $113,000; and the 111 concerns using only 1000 gallons per day, $14,600.

Needless to say it is highly improbable that each industry would fall into the proper water use—assessed valuation category. On the contrary, it is much more likely that this rate structure would result in glaring inequities. For example, think of small dairies, metal platers, canners, laundries, automatic car wash operations, and others in these catagories using anywhere from 100,000 to 1,000,000 or more gallons of water per month which could be badly hurt under the conditions described.

Fortunately, the circumstances described in this case are somewhat extreme, and have been used merely to illustrate the problem. The fact remains, however, that as long as rate schedules are based on water usage,

TABLE I

1. Cost of Amortization of Plant and Operation

Per Mil. Gal. Sewage Treated ..... $ 218
Per 1000 gal. Sewage Treated $0.218

2. Charge to Average Residence

Per 1000 gal. $0.75
Per Month $3.00

3. Allocation of Residential Revenue

To pay for Sewage Treatment ..... $\frac{0.218}{0.75}$ 29.2%

To pay for Sewers ..... $\frac{0.75 - 0.218}{0.75}$ 70.8%

4. Assuming Average Assessed Valuation of Residential property at $3000

Sewer service charge payment toward sewers is equivalent to tax levy of 86 cents/$100

5. Cost to Industry, per 1000 gallons

a. Customer using 0.2 MGD 45c
b. Customer using 0.05 MGD 46c
c. Customer using 0.01 MGD 47c
d. Customer using 0.001 MGD 61c

6. Allocation of Industrial Revenue

	Percent of Revenue	
	To Pay for Plant	To Pay for Sewers
a. Customer using 0.2 MGD	48.5	51.5
b. Customer using 0.05 MGD	47.5	52.5
c. Customer using 0.01 MGD	46.5	53.5
d. Customer using 0.001 MGD	35.9	64.1

there is little hope that completely equitable rate structures can be devised in cases where major sewer improvement projects are financed under the existing sewage works revenue bond statutes of Indiana.

Summary

In summary, it is noted that because of the lack of other suitable methods of financing, Indiana communities have undertaken major sewer improvements together with the construction of sewage treatment facilities under the provisions of the Sewer Service Charge and Revenue Bond Act. These sewer improvements, most of which might otherwise have been paid for through taxation, are generally included in establishing the rate base. Under these conditions charges levied strictly on a water usage basis cannot help but be inequitable, this inequity being more pronounced among the commercial and industrial group of consumers.

Louisville Ground Water Studies

The Department of Interior reports that during the period 1944-55 the net withdrawal of the water from wells in the Louisville area averaged 30 mgd. This was for industrial cooling and air conditioning and was pumped from glacial washed sand and gravel forming the Ohio River Valley floor. Water level fluctuation show the net recharge to the heavily pumped areas approximately balances the pumpage from the same area.

New Test Method Of Water Wells

The Department of the Interior reports that aqua for location and yield evaluation has been simplified by a test developed jointly by the U. S. Geological Survey and the Pennsylvania Geological Survey.

Tests involve the measurement of flow within the well bore, above and below each aquifer, as the well is pumped at various rates. Aquifers positions in a well are first determined by electric logging, discharge measurements are then made by releasing a small quantity of brine at any desired depth and following its movement with an electric conductivity device. Flow meters of various types can also be used. Results are summarized on a graph showing the discharge, or "feeding", rate of each aquifer as a function of water level decline, or draw-down. The well discharge at any given draw-down is the sum of an algebraic equation of the yielding and feeding rates of the various penetrating aquifers.

Sewer Camera

Mr. William D. Ulrich of Mar Vista, California has designed a battery operated camera and flash system for photographing the sewer interiors. Used to spot mis-alignment, faulty joints and slime accumulation. machine is mounted on a small metal boat and controlled from the surface. Pressed Nitrogen and heating elements avoid moisture on the camera lens. Patent No. 2,909,975 has been assigned to this device.

New Meter System

Rock Falls, Illinois, is reported to be the first city in the world to render remote registry for meters of all water customers. The equipment, manufactured by Vis-a-Meter, Inc. Kansas City, Kansas permits meter readers to note readings without getting entrance into the customer's buildings.

No Salt Found In Long Island Water

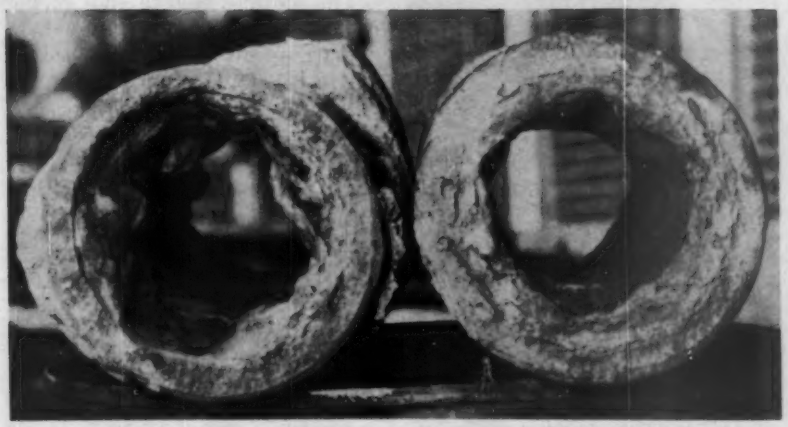
The U. S. Geological Survey reports that water used in Southeastern Queens and Nassau Counties totals about 163 mgd. This rate can be maintained for many decades despite the slow inland movement of a wedge shaped body of salt water. The information was based on 1955 findings made public by the Department of the Interior. The main body of salt water has a maximum width of about 700 feet and tapers as much as 4 miles inland. Landward movement is less than 100 feet per year in most places due to well pumping and from a slow rise in sea level.

Just a minute—I'm busy!

A city increases water distribution capacity through . . .

Watermain Cleaning

by PHIL HIRSCH,
Chicago, Ill.



Courtesy Ace Pipe Cleaning, Inc.

FIG. 1. ACCUMULATED deposits shown in these pipe sections were as much as 2 inches thick.

EDITOR'S NOTE: Many cities faced with increased demands for water look at tired old mains and question—replace or rehabilitate? Generally the size of the mains and feeder lines are adequate but their capacities have been restricted by deposits or tuberculation within the pipe. In many instances, such as reported in this article, cleaning has increased capacities of water distribution lines to meet requirements.

■ WATERMAIN CLEANING was undertaken by Murphysboro, Ill., for the first time. The mains had been in service for over 65 years and deposits as much as two inches thick had reduced the original inside diameter of piping by one-third of their capacity.

The city of some 11,000 population was expanding and had to increase capacity of its water distribution system. Either new mains had to be installed or the existing network cleaned. Cleaning was decided to be the best solution because flow could be increased through the existing distribution system to meet present demands as well as anticipated future requirements. Cleaning could be accomplished for a fraction of the cost necessary to install new mains.

Residents obtaining water from about half of the Murphysboro water distribution system were seriously short of supplies and often during peak demand periods were completely without water. Mr. Fraley, distribution superintendent, said that in some areas on many of the hydrants, "you could stop all water from coming out simply by putting your hand against the opening."

This affected area consisted of approximately 77,000 ft. of 4 and 6 inch mains and feeder lines. Accumulated deposits illustrated by pipe sections in Figure 1 restricted flow to the area at least 20 per cent. These pipes had deposits as much as 2 inches thick which reduced the carrying capacity one-third.

The Big Muddy River is the source of supply for the city. The raw water contains a relatively high percentage of manganese, the removal of which has been assisted through the construction of Crab Orchard Lake. This lake was built by the U.S. Corps of Engineers in 1940 and is reported as the largest man-made body of fresh water in the world. The headwaters of the Big Muddy flow into this lake allowing for some pre-precipitation of manganese.

New mains installed since construction of this lake have not been seriously affected by deposits restricting their capacity. Pumpage to the city distribution systems ranges from a minimum of 0.3 to a maximum of 0.8 mgd with the average near 0.5 mgd. Three electrically driven pumps having a total rated capacity of 1400 gpm supply the city through 10 and 12 inch mains. One 150,000 gal, elevated storage tank is located on the system which assists in meeting peak demands and maintaining pressure.

Cleaning Devices

Two devices were employed in cleaning deposits from old mains on

the system. They were a chain-head auger and a scraper-type cleaning tool.

The chain-head auger is essentially a steel rod which has short lengths of chain attached to it. On the end of each chain is a heavy metal weight. The steel rod is rotated at speeds between 300 and 1,000 rpm and the weights, swung out by centrifugal force, beat against the pipe knocking off the deposits. Power is supplied by a 25 h.p. truck-mounted motor equipped with a reel of flexible steel line 3,000 ft. long. This arrangement provides for simultaneous pushing and rotating the auger through the pipe sections.

The scraper type tool consists of several discs strung on a flexible steel rod and anchored front and back. Extending from the circular edge of the discs are rectangular spring steel scrapers bent at the ends (see Figure 2). This tool is pulled through the pipe sections by a power winch.

The chain-head auger is used in those pipes containing hard mineral deposits and the scraper-type tool is designed to remove incrustations or tubercles.

Courtesy Ace Pipe Cleaning, Inc.

FIG. 2. SCRAPER TYPE TOOL of several steel discs strung on flexible steel rod and anchored at both ends.

Courtesy Ace Pipe Cleaning, Inc.

FIG. 3. POWER SAW cuts section from upstream end of water main so that cleaning tool can be inserted into pipe.

Preparation for cleaning

Either tool can be used to clean pipe sections up to 3,000 ft. in length. They cannot negotiate bends greater than 45 degrees.

Pits are dug at both ends of the pipe section to be cleaned. These pits are usually 4 by 6 ft. wide and dug to a depth of one foot below the pipe. A power saw is used to remove 3 ft. lengths of the pipe exposed in the pits.

Pipe Cleaning

When using the scraper-type tool, the tool is inserted in the upstream end and the pipe section is joined again to the pressure main with Dresser couplings. The valve is opened and the tool is pushed by the force of water and pulled by the towline through the section to be cleaned.

In using the chain-head auger the tool is pushed through the section and removed, then water is released into the section to flush out debris.

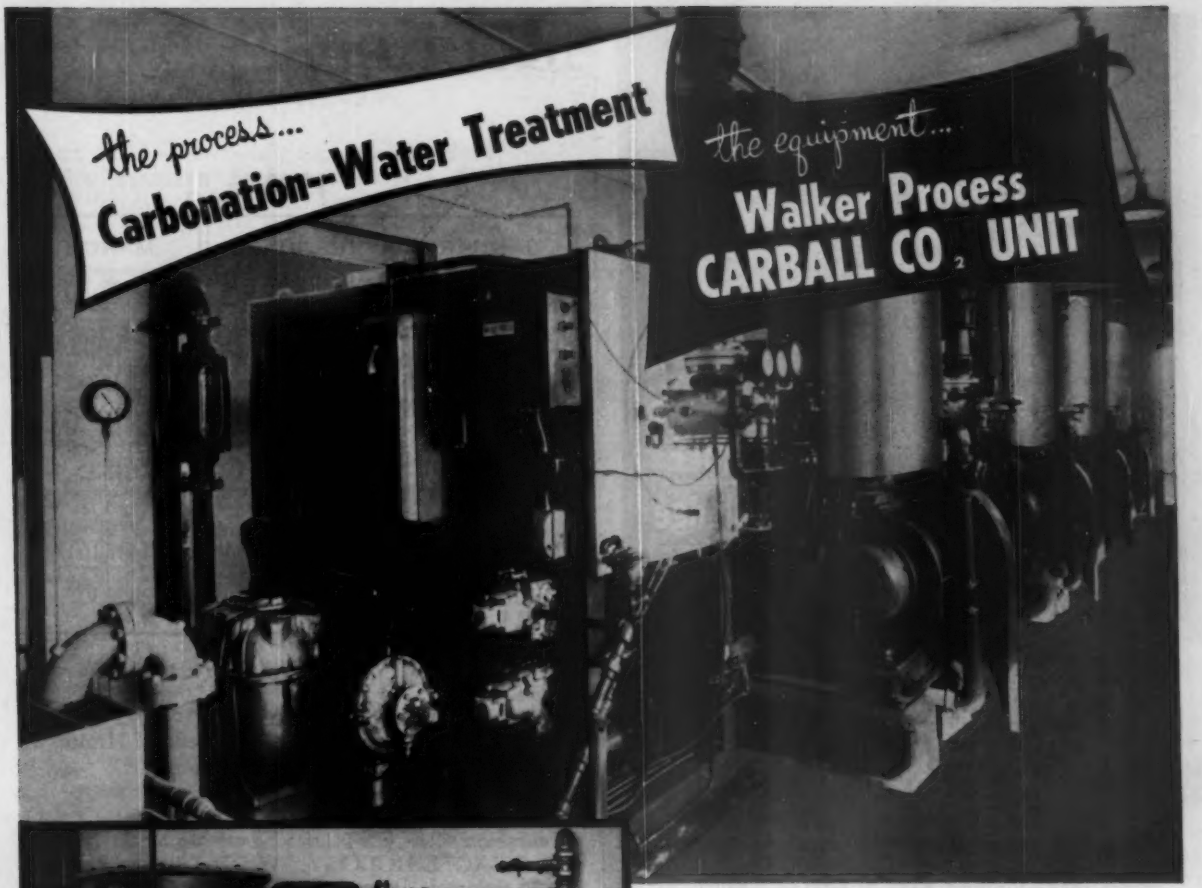
A portable pump is used in both instances to remove water and debris from the downstream pit. A fire hose is generally used to convey the discharge from this pump to a nearby storm drain. Any accumulation of solids remaining in the pit are shoveled out.

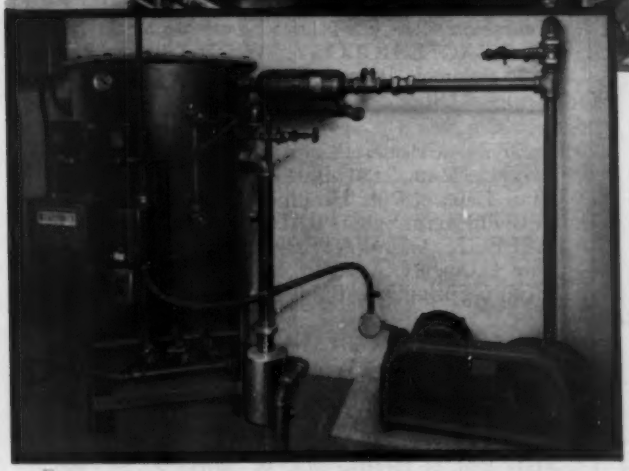
All "T's", elbows, and similar appertances were cleaned manually.

Summary

The Murphysboro personnel performed all pit excavation and backfilling with their own equipment. They inspected and replaced defective units, such as valves, in each section being cleaned. Pipe-runs averaged 800 ft.

The total costs for the entire cleaning operation came to approximately $34,000. This expenditure provided increased flow to outlying areas, improved hydrant capacities, and eliminated shortages in previously troubled areas. It is hopefully anticipated that the National Board of Fire Underwriters will re-evaluate the Murphysboro classification and place the homeowners in a lower rate category This would be an added tangible return from the expenditure of city funds for cleaning water mains.





Four size 4 Carballs at Kansas City, Mo. burn either gas or oil to produce max. of 40,000 lbs. CO_2/day. Size "O" unit at left produces 570 lbs. CO_2/day for Jefferson, Iowa Water Plant.

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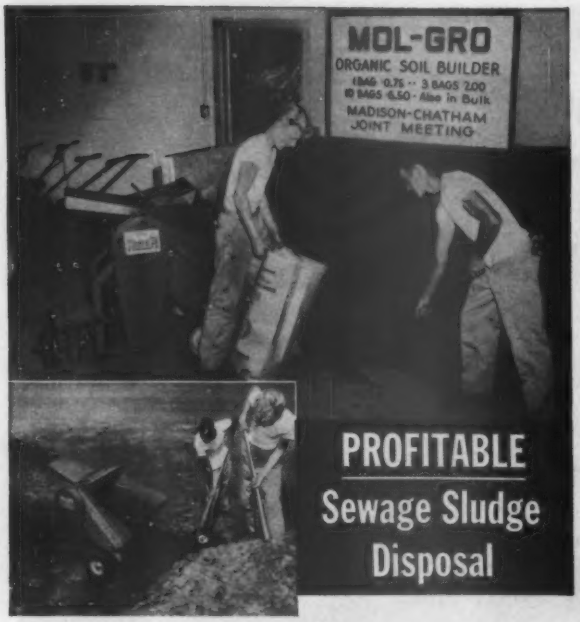

The Madison-Chatham (N.J.) Joint Meeting bags and sells their *Royerated sewage sludge cake*. While not big business, the operation does represent an additional source of municipal income.

The need for increasing municipal income keeps growing in importance. The climate of today's economy warns against tax increases. Economies of operation are being searched for.

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Jan. 20-22—New York City, N. Y. (*Park-Sheraton Hotel*)
NEW YORK SEWAGE & INDUSTRIAL WASTES ASSN. Exec. Secy: R. C. Sweeney, State Dept. of Health, 21 N. Broadway, White Plains, N. Y.

Jan. 25-29—Cincinnati, O. (*Taft Sanitary Eng. Center*) Course on "RECENT DEVELOPMENTS IN WATER BACTERIOLOGY." Write: Training Program 4676 Columbia Pkwy., Cinn. 26, Ohio (or to USPHS Regional Office

Jan. 27-29—Urbana, Ill. (*University of Illinois*)
CONFER. 2ND SANITARY ENGRS. sponsored by the State Dept. of Pub. Health and the University's Dept. of Civil Engrg. Subj: "RADIOLOGICAL HEALTH ASPECTS OF WATER SUPPLY." Write: William J. Downer, Asst. Chief San. Engr., Dept. of Pub. Health, Springfield, Ill.

Feb. 1-5—Chicago, Ill. (*Sherman Hotel*)
ASTM Committee Week

Feb. 3-5—Indianapolis, Ind. (*Sheraton-Lincoln Hotel*)
INDIANA SECTION, A.W.W.A., Secy: C. H. Canham State Brd. of Health, 1330 W. Michigan St., Indianapolis.

Feb. 14-18—New York, N. Y. (*Hotel Statler*)
AMERICAN INSTITUTE OF MINING, METALLURGICAL & PETROLEUM ENGINEERS.

Feb. 21-24—Atlanta, Ga. (*Biltmore Hotel*)
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS.

Mar. 14-18—Dallas, Texas (*Memorial Auditorium*)
Annual Convention NATIONAL ASSOCIATION OF CORROSION ENGINEERS.

Mar. 16-18—Chicago, Ill. (*Pick-Congress Hotel*)
ILLINOIS SECTION, A.W.W.A. Secy: D. W. Johnson, Research Engr. Cast Iron Pipe Research Assn., 3440 Prudential Plaza, Chicago 1.

Mar. 17—Boston, Mass. (*Statler Hotel*)
NEW ENGLAND SECTION, A.W.W.A. Secy: R. M. Soule Assoc. Sanit. Engr. State Dept. of Public Health, 511 State House, Boston.

Mar. 20-23— Savannah, Ga. (*DeSoto Hotel*)
SOUTHEASTERN SECTION, A.W.W.A. Secy: N. M. de Jarnette, Engr. Water Quality Div., State Dept. of Public Health, 309 State Office Bldg., Atlanta.

Mar. 23-24—Huntington, W. Va. (*Hotel Pritchard*)
WEST VIRGINIA SECTION, A.W.W.A. Secy: H. W. Hetzer, Engr., Union Carbide Chem. Co., Box 8361 South Charleston.

Mar. 23-24—Huntington, W. Va. (*Hotel Pritchard*)
WEST VIRGINIA SEWAGE AND INDUSTRIAL WASTES ASSN., Secy-Treas: Glen O. Fortney, St. Dept. of Health, Charleston 5, W. Va.

Apr. 1—Atlantic City, N. J. (*Hotel Traymore*)
NEW JERSEY SEWAGE & INDUSTRIAL WASTES ASSN. Secy: A. T. Leahey, P. O. Box 32, W. Trenton.

Apr. 3-8— New York City, N. Y. (*Coliseum*)
6TH NUCLEAR CONGRESS sponsored by EJC and other engineering and scientific societies including A.W.W.A.

Apr. 5-7—Binghamton, N. Y. (*Sheraton-Binghamton Hotel*) NEW YORK SECTION, A.W.W.A., Secy: Kimball Blanchard, N. Y. Branch Sales Off., Neptune Meter Co., 2222 Jackson Ave., Long Island City.

Apr. 5-14—Cleveland, O. (*Hotel Netherland-Hilton*)
NATIONAL MEETING—AMER. CHEM. SOCIETY DIV. OF WATER & SAN. CHEMISTRY Symposium on Indust. Wastes in conjunctn. with 137th Meeting., Prof. C. Fred Gurnham Head of Dept. of Chem. Engrg., Michigan State Univ., E. Lansing.

Apr. 7-8—Raleigh, N. C. (*State College Campus*)
9TH ANNUAL MUNICIPAL & INDUST. WASTE CONFER. Write: The Div. of College Extn., P. O. Box 5125 State College Sta., Raleigh, N. C.

Apr. 20-22—New York, N. Y. (*Manhattan College*)
THIRD BIOLOGICAL WASTE TREATMENT CONFER. Write: W. Wesley Eckenfelder, Assoc. Prof. Manhattan College, New York 71.

Apr. 20-22—Lincoln, Neb. (*Cornhusker Hotel*)
NEBRASKA SECTION, A.W.W.A. Secy: J. J. Rossbach Jr., Civ. Engr. Metropolitan Utilities Dist. 3906 N. 48th St., Omaha.

Apr. 20-22—Emporia, Kan. (*Broadview Hotel*)
KANSAS SECTION, A.W.W.A., Secy: H. W. Badley, Repr., Neptune Meter Co. 119 W. Cloud, Salina.

Apr. 22—Monterey Cal. (*Mark Thomas Inn*)
CALIFORNIA SECTION, A.W.W.A., Secy: R. E. Dodson, Jr., Supt. of Water Dept. of Utilities, Balboa Pk., San Diego.

CONTINUED ON PAGE 98A

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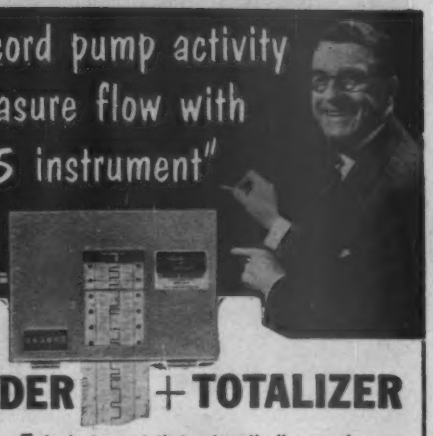

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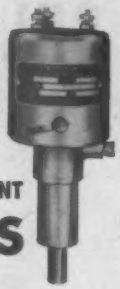

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KANSAS SEWAGE AND INDUSTRIAL WASTES, ASSN. Secy-Treas: James F. Aiken, 1900 E. 9th St. Wichita

Apr. 24-26—Buffalo, N. Y. (*Statler Hotel*)
CANADIAN SECTION, A.W.W.A., Secy: A. E. Berry, 72 Grenville St., Toronto, Ont.

Apr. 28-30—Billings, Mont. (*Northern Hotel*)
MONTANA SECTION, A.W.W.A., Secy: A. W. Clarkson, Asst. Dir., Div. of Envirn. Sanit. State Board of Health, Helena.

Apr. 28-30—Billings, Mont. (*Northern Hotel*)
MONTANA SEWAGE & INDUST. WASTES ASSN. Secy-Treas: A. W. Clarkson, Div. of Envirn. Sanit., State Brd. of Health, Helena

May 4-6—Portland, Ore. (*Benson Hotel*)
PACIFIC NORTHWEST SECTION, A.W.W.A., Secy: F. D. Jones, W. 2108 Maxwell Ave., Spokane 11, Wash.

May 15-20—Miami Beach, Fla. (*Bal Harbour Hotel*). A.W.W.A. CONVENTION

Jun. 12-17—Madison, Wis. (*Lorraine Hotel*)
CENTRAL STATES SEWAGE & INDUST. WASTES ASSN., Secy-Treas: Scott A. Linsley P. O. Box 3598, Childs Rd., St. Paul, Minn.

Jun. 19-22—Mexico City, Mexico (*Del Prado Hotel*)
MEETING OF AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

Jun. 20-24—Scarborough, England
INSTITUTE OF SEWAGE PURIFICATION, England Secy: W. F. A. Snook, 10 Cromwell Pl.,So. Kensington, London, S. W. 7, England

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New Bulletins

AVAILABLE FREE

Comprehensive Treatise on Rust and Corrosion Control

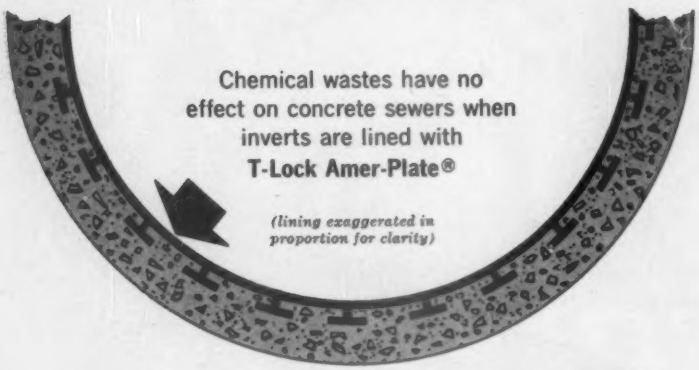
124

Rust-Oleum Corporation, Evanston, Illinois, has just released its new, 38-page system catalog entitled, Color Horizons. Having spent one year preparing the book for publication, the company believes it is the most comprehensive treatment on rust and corrosion control using protective coatings ever published.

The main feature of the booklet is a unique, gate-fold spread that shows the 67 actual color standards used in the New Color Horizons System. This system was formulated so that the protective coatings not only prevent rust formation but also provided colorful and decorative coverings. To achieve the eye-appealing end result, the system uses both special primers and specific top coatings applied in accordance with the system's formulation.

Other Rust-Oleum systems are described in detail and 76 full-color on-the-job photographs help give the booklet its bright easy-to-read appearance. The actual colors available in each system may be learned at a glance from the 110 color chips included in the catalog. A special technical data section features complete information on surface preparation, types of surfaces, application techniques, how to estimate gallonage needed for various sizes and shapes, a glossary of terms, mixing, thinning and drying information.

How to Protect Concrete Sewers from Chemical Wastes


Chemical wastes have no effect on concrete sewers when inverts are lined with T-Lock Amer-Plate®
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T-Lock Amer-Plate is a high polymer PVC sheet, easily cast into pipes, tunnels and structures to form a partial or complete 360° protective lining. Used in inverts, it permanently protects concrete from corrosive chemical effluents. In arch areas, it positively stops oxidized H_2S corrosion. T-Lock is also highly abrasion resistant; impartial tests show that it abrades at only 1/70th the rate of concrete.

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110

Bulletins Cover Measuring and Controlling Equipment

125

Simplex, Valve and Meter Co., Lancaster, Pa., announces the publication of a series of 2-page technical bulletins describing and explaining their measuring and controlling equipment. The literature contains drafts and technical illustrations to aid engineers, contractors and operators in selecting the proper equipment for specific job applications.

The items of equipment discussed in the new bulletins are: Simplex Standard Venturi Tubes, Simplex Orthoplex Supervisory Control, Simplex Mechanically Operated Rate of Flow and Loss of Head Gauges, Simplex Pneumatic Single and Double Indicating Receivers, and Simplex Type CCAV Controlled Closing Air Valve.

Circuline Sludge Collectors

126

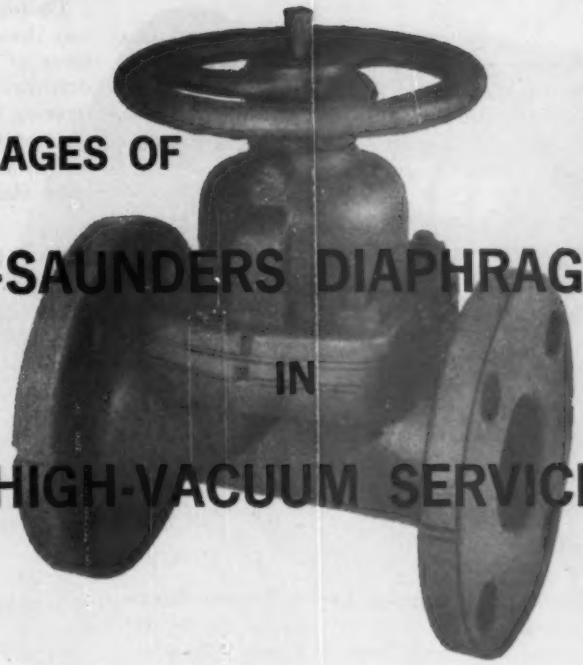
Link-Belt Company, Chicago, Ill., has recently released its 28-page book that presents its complete line of Circuline sludge collectors designed for water, sewage and industrial waste treatment settling tanks. This new book describes the company's two new series and six new types of collectors, which brings their line to six series and fifteen types of sludge collecting equipment.

Numerous photographs and illustrations provide a graphic display of various design, construction, operat-

CONTINUED ON PAGE 102A

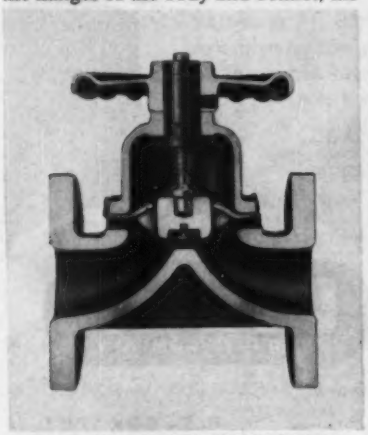
GRINNELL REPORTS ON VALVES:

THE ADVANTAGES OF GRINNELL-SAUNDERS DIAPHRAGM VALVES IN HIGH-VACUUM SERVICE



Dependable performance and long service life for vacuums down to 0.1 micron . . . with leak rates of less than 0.1 micron cubic foot/hour

One of the most important requirements of valves for high-vacuum service is that they must be vacuum-tight at all times during their operating cycle. Diaphragm valves of the Grinnell-Saunders manufacture fully meet this requirement. When clamped between the flanges of the body and bonnet, the

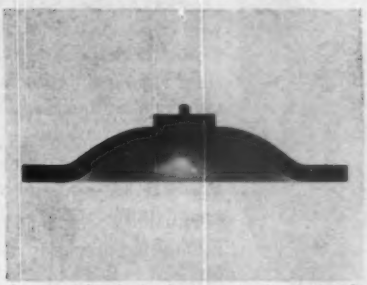


Valve provides vacuum-tight seal in closed position

diaphragm is easily made vacuum-tight down to 0.1 micron — with an in-leakage rate of less than 0.1 micron cubic foot/hour. Whether in the open, throttling or closed position, the diaphragm presents a smooth, unbroken face to the vacuum side of the chamber.

Rugged, nylon-reinforced diaphragms in a variety of materials

Grinnell has perfected a method of reinforcing its diaphragms with wear-resistant nylon. The result is a diaphragm that lasts longer at high-vacuum. The only part of the valve subject to service wear at any time is the diaphragm — which can easily be replaced in a matter of minutes, without removing the valve body from the system. Diaphragms are available in a wide choice of materials.



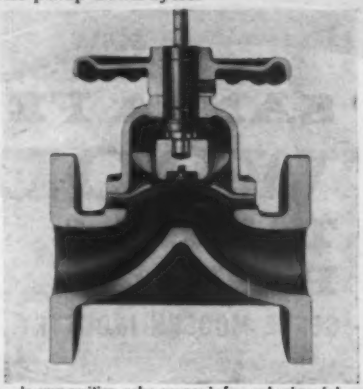
Rugged, reinforced nylon diaphragm gives long-lasting life

Contamination minimized

Construction of Grinnell-Saunders Diaphragm Valves provides separation of the working mechanism from the vacuum within the system. This isolation of lubricated working parts prevents contamination of the system from lubricant outgassing.

Large, unimpeded valve passage

The large passage of the Grinnell valve, in the open position, offers minimum impedance to the escape of random moving molecules in pumping down to high-vacuum, thus shortening the pump-down cycle.



In open position, valve passage is free and unimpeded

Special provisions:

Sealed bonnets are available for evacuation when required. Elastomer type diaphragms do not require evacuation of the bonnet. Valves with plastic diaphragms, used at elevated temperatures, do require evacuation of the bonnet for long diaphragm service life.

For more information

Get further facts about Grinnell-Saunders Diaphragm Valves. Learn how the diaphragm lifts high for streamline flow in either direction . . . and how the diaphragm seals firmly against the body weir for leak-tight closure. Write to: — Grinnell Company, Providence 1, Rhode Island.

New Bulletins

CONTINUED FROM PAGE 100A

ing and installation details of the collectors. Also included are engineering drawings and other pertinent data. In addition, the book contains two tables. One tabulates the required surface area for various flows and surface loadings for a given settling tank size. The other shows how to determine tank dimensions, volume and weir length.

Small Sewage Treatment Plant Discussed

127

Dorr-Oliver, Inc., Stamford, Conn., announces the availability of a new, 8-page bulletin entitled, "Small Plant Sewage Treatment". This bulletin describes the design, operation and advantages of four different equipment units each of which provides both clarification and sludge digestion in a single tank, and which are particularly applicable to small scale operations.

Photographs of installed equipment are presented in the bulletin, and diagrams of the equipment accompanies the articles. Also included is a flowsheet and a detailed order-specification section.

Valve Line Described

128

Circle Seal Products Co., Inc., Pasadena, Calif., has made available a 4-page booklet which describes their line of valves, including check valves, relief valves, shutoff valves, plug valves and custom valves.

The bulletin contains technical data, construction details, dimensional and material data, operating principles and order-specification information.

Pneumatic Level Transmitters

129

Bailey Meter Company, Cleveland, Ohio, is offering its new, 4-page bulletin describing their pneumatic, force-balance transmitters designed for the measurement of level over range spans of 1 inch water to 2000 inches of water, at maximum service pressures of 50, 1500 and 5000 psig.

Photographs, diagrams, and a cutaway drawing illustrate the main features of the unit, and dimensional drawings are included to help in figuring prospective installation. The main operating, installation and physical data are listed, and specification order-blank is included.

Heavy Duty Sludge Pumps

130

Mechanical Equipment Division, Komline-Sanderson Engineering Corp., Peapack, N. J., has recently published a 6-page brochure which describes their dual valve, plunger, heavy duty sludge pumps.

The bulletin contains detailed drawings and a listing of the unit's main features. Also included is a dimension table and a pump selection chart that enables the reader to determine the correct size pump for his needs.

Other features of the bulletin include photographs of the pump and a specification form which guides the user or purchaser of the equipment.

CONTINUED ON PAGE 104A

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SUPPLY COMPANY
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Dept. W-1, Box 117, Mineral Wells, Texas

New Bulletins

CONTINUED FROM PAGE 102A

Continuous Belt Drum Filter

131

Eimco Corporation, Salt Lake City, Utah, has released a new, 12-page bulletin intended to show how five-way savings can be made in the continuous vacuum filtration of difficult slurries with the use of their Eimcobelt continuous belt drum filter.

The bulletin states, and describes how the filter's new operating principle has resulted in savings in the use of chemical reagents, drying costs, maintenance, filter media costs, and cloth changing time, as compared to conventional drum filters. It also makes possible the continuous filtration of slurries that processors have been unable to filter before using vacuum drum filters.

An illustrated explanation of the Eimcobelt's operational features, and several pages of operating reports are included in the bulletin. On-the-job photographs of the filter, and an illustrated discussion of the unit's main features are also included.

High Capacity Flow Indicator

132

Brooks Rotameter Co., Lansdale, Pa., has made available a Design Specification Sheet which provides the essential details of its new, high capacity flow meter featuring an integral by-pass design.

Among the items presented are, materials of construction, capacities, scale and rating.

Indicating Equipment

133

Leeds and Northrup Company, Philadelphia, Pa., is offering a 2-page data sheet which describes its Speedomax H indicators, recorders and controllers for pH and redox.

The data sheet outlines the specifications of the various instruments, including the pH ranges and chart speeds, and features a chart that lists the types of control action obtainable.

A wire diagram, showing how the instrument components should be installed, is also included.

CONTINUED ON PAGE 106A

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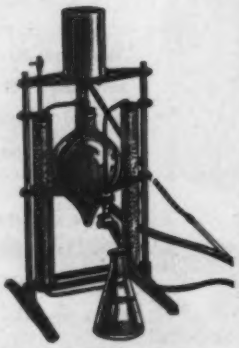

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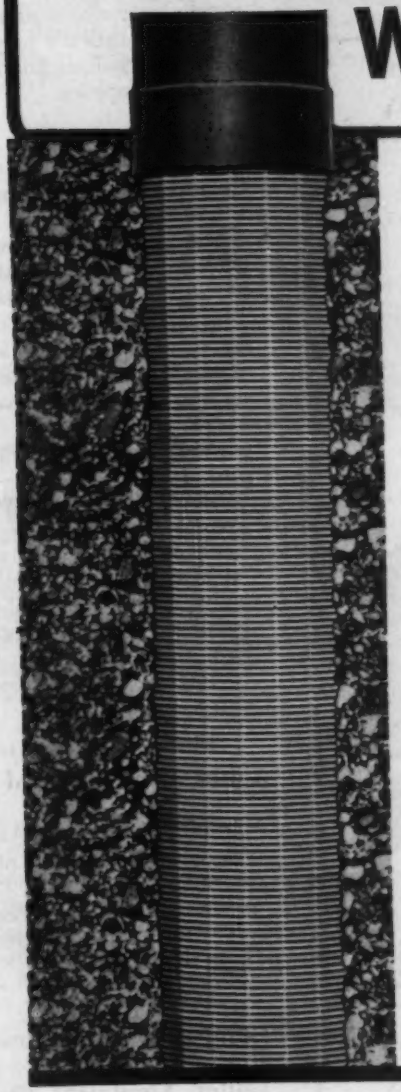

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New Bulletins

CONTINUED FROM PAGE 104A

Bearing Blocks and Takeups

134

Link-Belt Company, Chicago, Ill., has published a 16-page book which contains detailed information on the company's complete line of babbitted, bronze and plain bore bearing blocks and takeups.

With this publication, the company announces the addition of 119 new sizes, in eight series to its line. The new publication is divided in two sections, one section for bearing blocks and the other for takeups.

Design features, illustrations and descriptions of each type of block and takeup and its class of application are also included in the book. The complete equipment specifications, including details, dimensions, weights, and diagrams showing recommended loading ranges are listed as well.

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Submersible Pump

135

Kenco Pump Division, American Crucible Products Co., Lorain, Ohio, is offering its new 10-page, fully illustrated catalog featuring 32 leading and indexed applications for submersible pumps.

Corrosion-Resistant Saturator

136

B-I-F Industries, Inc., Providence, R. I., have recently issued a new bulletin describing a re-designed, completely corrosion-resistant saturator which automatically prepares a stock solution of sodium fluoride for treating water supplies.

Solving Tunnel Concreting Problems

137

The Master Builders Company, Division of American-Marietta Co., Cleveland, Ohio, have recently published a 28-page bulletin describing the case histories of twelve major tunneling projects where their product was used to help solve concreting problems.

Motor Control Digest

138

Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has recently issued a new, 162-page digest containing descriptive, pricing, technical and engineering information covering its complete line of motor controls.

Filter Plant Control System

139

Infilco, Inc., Tucson, Ariz., has announced the publication of a bulletin describing its new "C.-A.-P. System" for the automatic operation and control of filter plants operating on 3 to 15 psi output pressures.

Compact Proportioning Pump For Boiler Treatment Chemicals

140

B-I-F Industries, Inc., Providence, R. I., announce release of a bulletin which describes their new, plunger-type, small capacity proportioning pump for operation with small, low pressure boilers

Recording Instruments

141

General Electric Company, Schenectady, N. Y., is offering a new 12-page bulletin listing the complete specifications for the proper selection of General Electric recorders.

Scientific And Test Instruments

142

Minneapolis-Honeywell Regulator Co., St. Paul, Minn., has issued a new, condensed catalog which presents a brief description, prime specifications, an illustration and an additional information reference for each series of its scientific and test instruments.

Buyers Guide To Industrial Valves

143

Ohio Injector Company, Wadsworth, Ohio, has recently published a 24-page booklet called, "Buyers Guide", which provides a convenient method for the quick selection of valves by valve specifiers, users and purchasers.

Chemical Proportioning Pump

144

B-I-F Industries, Inc., Providence, R. I., has just released a new bulletin describing its new, electrically driven, positive displacement chemical proportioning pump designed for the accuracy proportioning of acids, alkalies, and other chemical solutions used to process water in industry.

Bio-Oxidation Aerator

145

Permutit Company, Division of Pfaudler Permutit, Inc., New York, N. Y., has published a six page bulletin describing the advantages of using the Permutit Permaerator in aeration systems. The bulletin contains diagrams and charts which illustrate the various design features and how the equipment operates.

High-Capacity Electric Generators

146

D. W. Onan & Sons, Minneapolis, Minn., recently released their new 1960 general catalogue which features the recently added line of high-capacity electric generating plants.

CONTINUED ON PAGE 108A

KOMLINE-SANDERSON

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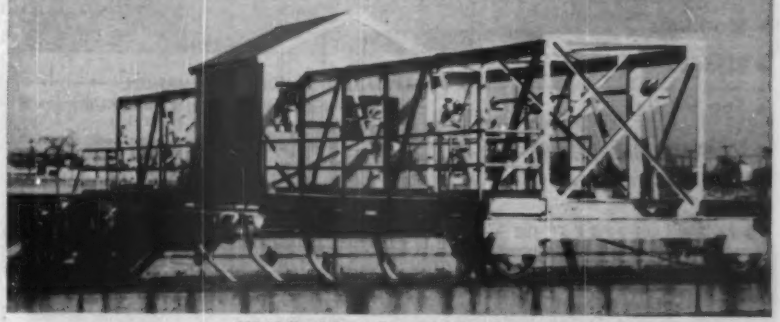

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These basic advantages are yours when you use Crispin Air Valves . . . simplified construction, easy accessibility, maximum durability, minimum maintenance and efficient operation. You're safe with Crispin Air Valves on the job!

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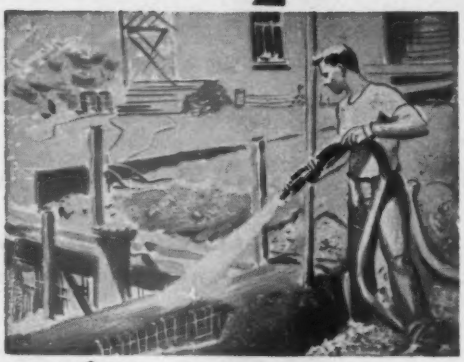

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New Bulletins

CONTINUED FROM PAGE 107A

Spray-Type Deaerator Heaters

147

Graver Water Conditioning Company, New York, N. Y., has made available a revised and enlarged bulletin on spray type dearating heaters. Bulletin, WC-101C, explains many aspects of the process and equipment, including principles of dearation, dearator operation, standard designs available, design features and accessory equipment.

Lining Protects Steel & Concrete Tanks

148

Amercoat Corporation, South Gate, Calif., has issued a new, six page, illustrated brochure describing Amer-Plate industrial lining. This is a dense, flexible polyvinyl chloride sheet used to line plating, pickling and other process tanks and vessels.

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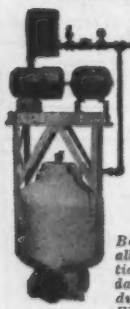

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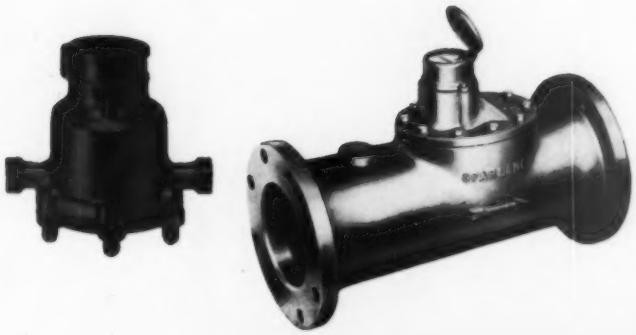

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